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THE CHIRURGICAL WORKS OF PERCIVALL POTT, F.R.S.

Surgeon to St. BARTHOLOMEW'S HOSPITAL.

VOL. III.

CONTAINING

I. Obſervations on the Nature and Conſequences of thoſe injuries to which the Head is liable from external Violence.

II. Some few General Remarks on FRACTURES and DISLOCATIONS.

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MDCCLXXI.

TO

JOHN DARKER, Esq;

TREASURER

OF

St. BARTHOLOMEW'S-HOSPITAL.

SIR,

THE polite and friendly treatment which the officers of St. Bartholomew's have always received from you, is very gratefully acknowledged by them all.

DEDICATION.

Give me leave as one of them, to return you my particular thanks, to beg leave to addreſs the following ſheets to you, and to ſubſcribe myſelf,

SIR,

Your obliged, and

Obedient humble Servant,

Percivall Pott.

OBSERVATIONS

ON THE

NATURE and CONSEQUENCES

OF THOSE

INJURIES to which the HEAD is liable from external Violence.

SECT. I.

Wounds of the Scalp.

PREVIOUS to an account of ſuch wounds and injuries of the head, as intereſt the ſkull, the brain, and its membranes; it may not be amiſs to take ſome ſmall notice of thoſe to which the ſcalp is liable. For this, though it be called the common tegument of the head, yet from the variety of parts of which it is compoſed, from their ſtructure, connexions, and uſes,

injuries done to it, by external violence, become of much more conſequence, than the ſame kind of ills can prove, when inflicted on the common teguments of the reſt of the body.

The covering, called the ſcalp, conſiſts of the cutis; the membrana adipoſa, or cellularis; the expanded tendons of the frontal, occipital, and temporal muſcles, (forming a kind of aponeuroſis;) and the membrane which immediately covers the bones of the ſkull, called therefore the pericranium.

This variety of parts, upon the infliction of wounds, blow, &c. frequently occaſions a variety of ſymptoms; which ſymptoms ought by practitioners to be carefully and properly diſtinguiſhed from each other; not only becauſe they often ariſe from the diſtinct, and particular nature, of the part injured; but becauſe they generally point out the moſt effectual means of relief. If to theſe conſiderations we add another, no leſs true, and important, (viz.) that there is, and muſt be a conſtant communication, by means of blood-veſſels, between all the parts without and within the head, it will appear, that injuries done to this part, tho' ſeemingly, and at firſt ſight, ſlight and trivial,

vial, may ſometimes prove of the greateſt conſequence.

I will not waſte the reader's time, by entering into a detail of the method of treating common inciſed wounds; but proceed immediately to thoſe which, (tho' the miſchief is originally confined to the mere ſcalp,) yet are frequently very terrible to behold; are often attended with alarming ſymptoms, and ſometimes with danger. Theſe are what are called lacerated wounds; and thoſe made by puncture. The former may be reduced to two kinds, (viz.) thoſe in which the ſcalp, tho' torn, or unequally divided, ſtill keeps its natural ſituation, and is not ſtript or ſeparated from the cranium, to any conſiderable diſtance, beyond the breadth of the wound; and thoſe, in which it is conſiderably detached, from the parts it ought to cover.

The firſt of theſe, if ſimple, and not combined with the ſymptoms, or appearances of any other miſchief, do not require any particular, or different treatment, from what the ſame kind of wounds require in all other parts: but the latter, (thoſe in which the ſcalp is ſeparated, and detached from the parts it ought to cover,) are not

only, by the different methods in which they may be treated, frequently capable of being cured, with a conſiderable deal, more, or leſs, eaſe, and expedition; but are alſo ſometimes a matter of great conſequence to the health and well-being of the patient. Both writers and practitioners differ much, in their advice, and conduct on this ſubject. With ſome it is a practice, immediately to remove ſuch portion of the ſcalp as is fairly and perfectly detached from the parts underneath; with others, to attempt its preſervation.

Each of theſe opinions can be conſidered in a general ſenſe only; not as applicable to every individual caſe without diſtinction: and taken in ſuch general conſideration, they cannot be both right. It may therefore be worth while to enquire, what reaſons each party has to give for its opinion and conduct.

They who adviſe the removal, affirm, that when a large portion of the ſcalp has been perfectly and totally ſeparated from the parts it ought to cover, and that for ſome conſiderable ſpace, it will not again coaleſce or unite with ſuch parts; and therefore that an attempt to procure ſuch

union,

union, by replacing the ſeparated piece, will only protract the time of cure, by furniſhing a lodgment for matter, and ſloughs; which matter and ſloughs muſt prevent the thing intended. That in caſe of large wounds, or of thoſe produced by great force, as we cannot by any means be certain, that no miſchief is done to the parts under the cranium, the replacing the lacerated ſcalp, may not only prevent our immediate enquiry into the nature of ſuch miſchief, but may conceal, and hide (at leaſt for a time) ſuch future appearances as might furniſh indications for a ſurgeon's conduct.

They who adviſe the preſervation of the ſeparated * ſcalp, do it upon a ſuppoſition, that it will in general unite again; that if it does, the patient may thereby be ſpared a great deal of pain; ſave much time, and ſuſtain much leſs deformity: that with regard to the immediate enquiry into the ſtate of the cranium, it may be made before the ſcalp is replaced: that if there be no

* I preſume I need not obſerve, that when I ſay *ſeparated*, I mean only with regard to the inferior ſurface of ſuch piece, and that it is ſtill contiguous with ſome part of the ſkin.

no preſent ſymptoms which indicate injury done to the parts underneath, it would be abſurd to act merely upon the preſumption, that there may be ſome in future: that it will be more proper and vindicable, to do what is right at firſt; or according to the preſent circumſtance, and to attend to what *may* happen or occur hereafter, when ſuch occurrences have happened: and that the formation of matter, and ſloughs, under the detached and replaced portion, will not, in general, under proper management, prevent its reunion.

It is to be preſumed, that every practitioner wiſhes to cure his patients as ſoon as he can; by the leaſt painful means, and in ſuch manner as ſhall be productive of the leaſt poſſible deformity or defect; taking care at the ſame time, not to be inattentive to any evil, which may ariſe; nor to omit, or neglect doing whatever may be neceſſary during ſuch cure.

Upon this principle, I make no ſcruple of declaring it as my opinion, that the preſervation of the ſcalp ought always to be attempted, unleſs it be ſo torn as to be abſolutely ſpoiled, or there are manifeſt preſent ſymptoms of other miſchief. This kind of

wound is ſometimes very terrible to look at; and they who have not been accuſtomed to ſee it, may be inclined to think there is no remedy but exciſion; but I have ſo often made the experiment of endeavouring to preſerve the torn piece, and have ſo often ſucceeded, that I would recommend it as a thing always to be attempted, even tho' a part of the cranium ſhould be perfectly bare, unleſs the two circumſtances already mentioned render it improper or impracticable. The removal of it neceſſarily produces a larger ſore, which muſt require a good deal of time to heal, and muſt leave a conſiderable deformity; the preſervation of it prevents both.

Therefore when ſuch caſe occurs, let the ſurgeon be particularly careful to examine, whether there are any appearances, or ſymptoms, of any other kind of miſchief beſide what the ſcalp has ſuſtained; and if there be neither, let him make the torn piece clean from all dirt, or foreign bodies; and reſtore it quickly, and as perfectly as he can, to its natural ſituation.

The manner in which it is to be there maintained, muſt a good deal depend upon the particular circumſtances of each indivi-

dual caſe, and therefore muſt be left to the ſurgeon, who will make uſe of plaſter, bandage, and ſuture, together or ſeparately, as he ſhall find them moſt convenient, and beſt fitted to the purpoſe.

I am aware that the very mention of a ſuture in a wound of the ſcalp, particularly a lacerated one, will ſtartle ſome of my readers, who have been taught that it is always wrong in both: I know that this is the general doctrine; but I know alſo, that although it be ſometimes true, yet if it be implicitly adhered to, it will prevent a practitioner now and then from receiving a very uſeful aſſiſtance. A ſtitch, made with a ſlip-knot, will ſometimes, hold the divided parts in ſuch ſituation, as will greatly expedite a cure: in many caſes a very ſhort time will anſwer the end, and the thread may be removed as ſoon as ever the purpoſe is accompliſhed, or the ſuture becomes either improper or uſeleſs.

In ſome caſes, this will be all that is required; the looſened ſcalp will unite with the part from which it was torn and ſeparated, and there will be no other ſore, than what ariſes from the impracticability of bringing the lips of the wound into

ſmooth

ſmooth and immediate contact; the ſcar of which ſore muſt be ſmall in proportion.

On the other hand, it ſometimes happens that ſuch perfect re-union is not to be obtained; in which caſe matter will be formed and collected in thoſe places, where the parts do not coaleſce; but this does not neceſſarily make any difference, either in the general intention, or in the event; this matter may eaſily be diſcharged, by one or two ſmall openings made with a lancet; the head will ſtill preſerve its natural covering; and the cure will be very little retarded by a few ſmall abſceſſes.

I muſt deſire not to be miſunderſtood: I do not mean to ſay, that it muſt be always, and invariably right, to return the looſened ſcalp, and to endeavour to procure its immediate re-union; or that ſuch attempt will always ſucceed: I only mean to ſignify, that it is my opinion, (and that founded on experience) that the mere ſeparation or detachment of the ſcalp, to however large an extent, is not a good, and ſufficient reaſon, for cutting off any part of it in caſes where no other miſchief ſeems to have been done, in which the cranium is uninjured, and the parts within it unhurt; and, that the at-

tempt

tempt to procure a re-union with the parts from which it was ſeparated, tho' it will ſometimes fail, yet will moſt frequently ſucceed; and is always worth making; as ſuch experiment properly made, can never be attended with any real inconveniences.

In ſome caſes, the whole ſeparated piece, will (as I have ſaid before) unite perfectly, and give little or no trouble; eſpecially in young, and healthy perſons; in ſome, the union will take place in ſome parts, and not in others; and conſequently matter will be formed, and require to be diſcharged, perhaps at ſeveral different points; and in ſome particular caſes, circumſtances, and habits, there will be no union at all: the torn cellular membrane, or the naked aponeuroſis, will inflame, and become ſloughy; a conſiderable quantity of matter will be collected, and perhaps the cranium will be denuded: but even in this ſtate of things, which does not very often happen, where proper care has been taken, and is almoſt the worſt which can happen in the caſe of mere, ſimple laceration, and detachment, I ſay, even in this, if the ſurgeon will not be too ſoon, nor too much alarmed, nor in a hurry to cut, he will often

ten find the cure much more feaſible than he may at firſt imagine: let him take care to keep the inflammation under by proper means; let him have patience till the matter is fairly and fully formed, and the ſloughs perfectly ſeparated; and when this is accompliſhed, let him make a proper number of dependant openings for the diſcharge of them; and let him by bandage, and other proper management, keep the parts in conſtant contact with each other; and he will often find, that although he was foiled in his firſt intention of procuring immediate union, yet he will frequently ſucceed in this his ſecond; he will ſtill ſave the ſcalp, ſhorten the cure, and prevent the great deformity ariſing, (particularly to women) not only from the ſcar, but from the total loſs of hair.

I have ſaid, that this union may often be procured, even tho' the cranium ſhould have been perfectly denuded by the accident; and it is true; not only tho' it ſhould have been ſtript of its pericranium at firſt; but even if that pericranium ſhould have become ſloughy and caſt off, as I have often ſeen,

Exfo-

Exfoliation from a cranium laid bare by external violence, and to which no other injury has been done than merely ſtripping it of its covering, is a circumſtance which would not ſo often happen, if it was not taken for granted, and the bone treated according to ſuch expectation; the ſoft open texture of the bones of children and young people, will frequently furniſh an incarnation, which will cover their ſurface, and render exfoliation quite unneceſſary; and even in thoſe of mature age, and in whom the bones are ſtill harder, exfoliation is full as often the effect of art, as the intention of nature, and produced by a method of dreſſing, calculated to accompliſh ſuch end, under a ſuppoſition of its being neceſſary. Sometimes indeed it happens, that a ſmall ſcale will neceſſarily ſeparate, and the ſore cannot be perfectly healed till ſuch ſeparation has been made; but this kind of exfoliation will be very ſmall, and thin in proportion to that produced by art; that is, that produced by dreſſing the ſurface of the bare bone with ſpirituous tinctures, &c: and when a wound on the head, with a ſound uninjured bone, denuded by the accident, ſhews a diſpoſition to heal without exfoliation; it

never

never can be right to counteract nature, and oblige her to do that ſhe is not inclined to, and which ſhe would accompliſh her purpoſe better without doing.

If the ſcalp be detached by ſuch means, or with ſuch force of inſtrument, that the ſkull, or parts within it have ſuffered, then the immediate union of the ſkin becomes impracticable, and it would be highly injudicious to attempt it; our attention then muſt be paid to the greater evil; it then becomes another kind of caſe, and all that need be ſaid of it in this place, is, that although ſuch miſchief does generally require the removal of ſome part, yet even in this ſituation, no more of it ſhould be cut off than what will be neceſſary for the detection and proper treatment of ſuch miſchief. In ſhort, whether conſidered as ſkin, or as the ſeat of the hair, it ought never to be removed wantonly, or without abſolute neceſſity.

Small wounds, that is, ſuch as are made by inſtruments, or bodies, which pierce, or puncture, rather than cut, are in general more apt to become inflamed, and to give trouble, than thoſe which are larger; and in this part particularly, are ſometimts attended

tended with ſo high inflammation, and with ſuch ſymptoms, as alarm both patient and ſurgeon.

The parts capable of being hurt by ſuch kind of wound, are the ſkin, the tela cellulosa, the expanded tendons of the muſcles of the ſcalp, and the pericranium.

If the wound affects the cellular membrane only, and has not reached the aponeuroſis or pericranium, the inflammation, and tumour, affect the whole head, and face; the ſkin of which wears a yellowiſh caſt, and is ſometimes thick ſet with ſmall bliſters, containing the ſame coloured ſerum; it receives the impreſſion of the fingers, and becomes pale for a moment, but returns immediately to its inflamed colour; it is not very painful to the touch; and the eye-lids and ears are always comprehended in the tumefaction, the former of which are ſometimes ſo diſtended, as to be cloſed; a feveriſh heat, and thirſt, generally accompany it; the patient is reſtleſs, has a quick pulſe, and moſt commonly a nauſea, and inclination to vomit.

This accident generally happens to perſons of bilious habit, and is indeed an inflammation of the eryſipelatous kind; it is ſomewhat

alarming

alarming to look at, but is not often attended with danger. The wound does indeed neither look well, nor yield a kindly diſcharge, while the fever continues, but ſtill it has nothing threatening in its appearance; none of that look which beſpeaks internal miſchief; the ſcalp continues to adhere firmly to the ſkull; and the patient does not complain of that tenſive pain, nor is afflicted with that fatiguing reſtleſſneſs which generally attends miſchief underneath the cranium.

Phlebotomy, lenient purges, and the uſe of the common febrifuge medicines, particularly thoſe of the neutral kind, generally remove it in a ſhort time. When the inflammation is gone off, it leaves on the ſkin a yellowiſh tint, and a dry ſcurf, which continue until perſpiration carries them away; and upon the diſappearance of the diſeaſe, the wound immediately recovers a healthy aſpect, and ſoon heals without any farther trouble.

Wounds and contuſions of the head, which affect the brain and its membranes, are alſo ſubject to an eryſipelatous kind of ſwelling and inflammation; but is very different, both in its character and conſequences from the preceding.

In

In this (which is one of the effects of inflammation of the meninges) the febrile ſymptoms are much higher; the pulſe harder and more frequent; the anxiety and reſtleſſneſs extremely fatiguing, the pain in the head intenſe; and as this kind of appearance is, in theſe circumſtances, moſt frequently the immediate precurſor of matter forming between the ſkull and dura mater, it is generally attended with irregular ſhiverings, which are not followed by a critical ſweat, nor afford any relief to the patient. To which it may be added, that in the former caſe the eryſipelas generally appears within the firſt three or four days; whereas in the latter, it ſeldom comes on till ſeveral days after the accident, when the ſymptomatic fever is got to ſome height. In the ſimple eryſipelas, although the wound be crude, and undigeſted, yet it has no other mark of miſchief; the pericranium adheres firmly to the ſkull, and upon the ceſſation of the fever, all appearances become immediately favourable. In that which accompanies injury done to the parts underneath, the wound not only has a ſpongy, glaſſy, unhealthy aſpect, but the pericranium in its neighbourhood, ſe-

parates

parates ſpontaneouſly from the bone, and quits all coheſion with it. In ſhort, one is an accident, proceeding from a bilious habit, and not indicating any miſchief beyond itſelf; the other is a ſymptom, or a part, of a diſeaſe, which is occaſioned by injury done to the membranes of the brain; one portends little or no ill to the patient, and almoſt always ends well; the other implies great hazard, and moſt commonly ends fatally. It is therefore hardly neceſſary to ſay, that it behoves every practitioner to be careful in diſtinguiſhing them from each other.

If the wound be a ſmall one, and has paſſed thro' the tela celluloſa, to the aponeuroſis, and pericranium, it is ſometimes attended with very diſagreeable, and even very alarming ſymptoms; but which ariſe from a different cauſe, and are very diſtinguiſhable from what has been yet mentioned.

In this the inflamed ſcalp does not riſe into that degree of tumefaction, as in the eryſipelas; neither does it pit, or retain the impreſſion of the fingers of an examiner; it is of a deep red colour, unmixt with the

yellow tint of the eryſipelas; it appears tenſe, and is extemely painful to the touch; as it is not an affection of the tela celluloſa, and as the ears and the eye-lids are not covered by the parts in which the wound is inflicted, they are ſeldom, if ever, comprehended in the tumor, though they may partake of the general inflammation of the ſkin: it is generally attended with acute pain in the head, and ſuch a degree of fever as prevents ſleep, and ſometimes brings on a delirium.

A patient in theſe circumſtances, will admit more free evacuations by phlebotomy, than one labouring under an eryſipelas: the uſe of warm fomentation is required in both, in order to keep the ſkin clean and perſpirable; but an emollient cataplaſm, which is generally forbid in the former, may in this latter caſe be uſed to great advantage.

When the ſymptoms are not very preſſing, nor the habit very inflammable, this method will prove ſufficient; but it ſometimes happens, that the ſcalp is ſo tenſe, the pain ſo great, and the ſymptomatic fever ſo high, that by waiting for the ſlow effect of ſuch means, the patient runs a

riſque

riſque from the continuance of the fever; or elſe the injured aponeuroſis, and pericranium becoming ſloughy, produce an abſceſs, and render the caſe both tedious and troubleſome. A diviſion of the wounded part, by a ſimple inciſion down to the bone, about half an inch or an inch in length, will moſt commonly remove all the bad ſymptoms; and, if it be done in time, will render every thing elſe unneceſſary.

The injuries to which the ſcalp is liable from contuſion, or the appearances produced in it by ſuch general cauſe, may for method-ſake be divided into two claſſes, viz. thoſe in which the miſchief is confined merely to the ſcalp; and thoſe in which other parts are intereſted.

The former, which only comes under our preſent conſideration, is not indeed of importance, conſidered abſtractedly. The tumour attending it is either very eaſily diſſipated, or the extravaſated blood cauſing it, is eaſily got rid of by a ſmall opening. I ſhould not therefore have thought it of ſuch conſequence, as to be worth mentioning in this place, had it not been for an ac-

cidental circumſtance, which ſometimes attends it, and renders it liable to be very much miſtaken.

When the ſcalp receives a very ſmart blow, it often happens that a quantity of extravaſated blood immediately forms a tumor, eaſily diſtinguiſhable from all others, and generally very eaſily cured. But it alſo ſometimes happens, that this kind of tumor produces, to the fingers of an unadviſed or inattentive examiner, a ſenſation, ſo like to that of a fracture, with depreſſion of the cranium, as may be eaſily miſtaken. Now, if, upon ſuch ſuppoſition, a ſurgeon immediately removes the tumid ſcalp, he may give his patient a great deal of unneceſſary pain, and for that reaſon run ſome riſque of his own character.

The touch is, in this caſe, ſo liable to deception, that recourſe ſhould always be had to other circumſtances and ſymptoms, before an opinion be given.

If a perſon, with ſuch tumor occaſioned by a blow, and attended with ſuch appearances, and feel, has any complaint, which ſeems to be the effect of preſſure made on the brain and nerves; or of any miſchief done to the parts within the cranium; the

diviſion, or removal of the ſcalp in order to inquire into the ſtate of the ſkull, is right and neceſſary: but if there are no ſuch general ſymptoms, and the patient is in every reſpect perfectly well, the mere feel of ſomething like a fracture, will not authoriſe, or vindicate ſuch operation, ſince it will often be found, that ſuch ſenſation is a deception; and that when the extravaſated fluid is removed, or diſſipated, the cranium is perfectly ſound and uninjured.

The ſecond kind of tumor attending the contuſed ſcalp, viz. that which ariſes from injury done to the cranium, and parts within, does ſo abſolutely proceed from, and depend upon ſuch injury, as not to fall under our conſideration in this place at all, but will be conſidered at large when we come to ſpeak of the miſchiefs done to the ſkull and brain by colliſion, or contuſion.

From what has been ſaid it appears, that the ſcalp, taken in a general ſenſe, is when wounded or bruiſed, liable to be affected with four kinds of tumor; each of which has a diſtinct cauſe, and requires, or permits, a different method of treatment.

The firſt does not imply any injury done to the parts within the ſkull; requires no operation; and almoſt always is cured by general remedies.

The ſecond, or that which is cauſed by the ſpontaneous ſeparation of the peri-cranium from the ſkull, in conſequence of internal miſchief, is not at firſt attended with very preſſing ſymptoms; but whoever has obſerved their progreſs, and attended to their event, muſt know what fatal, and frequently irreſiſtible evil, it is the fore-runner of: nothing leſs than the inflammation, and putrefaction of the membranes of the brain, and the formation of matter between them and the ſkull; and that it is a caſe which, of all others, will leaſt admit delay.

The third, though it ſometimes gives way to free evacuation, and lenient external applications, yet is ſometimes alſo attended with ſymptoms, which are too preſſing to wait the effect of ſuch remedies, and is capable of being immediately relieved by a diviſion of the inflamed and irritated parts; whereas the ſame inciſion, made into the firſt kind of tumefaction,

would

would moſt probably exaſperate the diſeaſe, and heighten the ſymptoms.

The fourth, conſiſting of extravaſated blood, ſeldom requires any chirurgic operation; time, and the uſe of the common diſcutient applications *, almoſt always diſſipate it; and it only becomes of conſequence, by the poſſibility of its being miſunderſtood and miſtreated.

* Among which I know of none equal to a ſolution of crude ſal ammon. in vinegar and water, or ſpt. vin.

SECT. II.

Effects of contuſion, on the dura mater, and parts within the ſkull.

IN order to underſtand rightly, and have a clear idea of this kind of injury, it is neceſſary to recollect, that the veſſels of the pericranium, thoſe of the diploe, or medullary ſubſtance between the two tables of ſome parts of the cranium, and thoſe of the dura mater within it, do all, conſtantly, and freely communicate with each other; and that this communication is carried on, by means of innumerable foramina, found, in all parts, of both ſurfaces of the ſkull, as well as at the ſutures; that upon the freedom of this communication, depends, the healthy, and ſound, ſtate of all the parts concerned in it; and, that from the interruption, or deſtruction, of this, proceed moſt of the ſymptoms attending violent contuſions of the head, extravaſations of fluid, between the cranium and dura mater, inflammations of the ſaid membrane,

brane, and ſimple undepreſſed fracture of the ſkull.

The pericranium is ſo firmly attached to the outer ſurface of the ſkull, as not to be ſeparable from it without conſiderable violence; and when ſuch violent ſeparation is made, in a living ſubject (eſpecially if young) the cranium is always ſeen to bleed freely, from an infinite number of ſmall foramina. The dura mater, which is a firm ſtrong membrane, is almoſt as intimately attached to the inſide of the ſkull, as the pericranium is to the outſide, and by the ſame means, viz. by veſſels; and by theſe means a conſtant circulation, and communication are preſerved, and maintained, between the two membranes; and the bones dividing them. This, all the appearances, which attend the ſcalping a living perſon, or the ſeparation of the ſkull from the dura mater of a dead one, (eſpecially if ſuch perſon died apoplectic, or was hanged) prove beyond all doubt: in the former, the blood, will, (as I have already obſerved) be ſeen iſſuing from every point of the ſurface of the cranium; in the latter, not only a conſiderable degree of force will be found neceſſary to detach the ſawed bone from the ſubjacent membrane,

but,

but, when it is removed, a great number of bloody points will be ſeen all over the ſurface of the latter; which points, if wiped clean, do immediately become bloody again; being only the extremities of broken veſſels. Theſe veſſels are largeſt at, and about the ſutures; at which places the adheſion is the ſtrongeſt, and the hæmorrhage upon ſeparation the greateſt.

It has been thought by many, that the dura mater was attached to the ſkull, only at the ſutures; that in all other parts it was looſe, and unconnected with it; and, that it conſtantly enjoyed or performed an oſcillatory kind of motion; or was alternately elevated and depreſſed. This idea, and opinion, were borrowed from the appearance which the dura mater makes in a living ſubject, after a portion of the ſkull has been removed: but although it has been inculcated by writers of great eminence, yet it has no foundation in truth or nature; and has miſled many practitioners, in their opinions, not only of the ſtructure and diſpoſition of this membrane, but in their ideas of its diſeaſes.

The dura mater does on the internal ſurface of the bones of the cranium, the of-

fice

face of perioſteum, in the ſame manner as the pericranium does on the external; (at leaſt they have no other:) to this it is ſo firmly, and ſo generally attached, as to be incapable of any, even the ſmalleſt degree of motion. The alternate elevation, and ſubſidence of it, which are obſervable, when any portion of it is laid bare, are owing to a very different cauſe from any power in itſelf; neither is, nor can ever be performed, until a piece of the cranium has been forcibly taken away; and conſequently cannot poſſibly be natural, or neceſſary.

By blows, falls, and other ſhocks, ſome of the larger of thoſe veſſels which carry on this communication between the dura mater and the ſkull, are broken, and a quantity of blood is ſhed upon the ſurface of that membrane. This is one ſpecies of bloody extravaſation; and indeed the only one which can be formed between the ſkull and dura mater. If the broken veſſels be few, and the quantity of blood which is ſhed be ſmall, the ſymptoms are generally ſlight, and by proper treatment diſappear *.

If

* This muſt be ſuppoſed to be ſpoken in a general ſenſe; becauſe it is well known, that ſometimes a very ſmall

If they are large, or numerous, or the quantity of extravaſated fluid conſiderable, the ſymptoms are generally urgent in proportion: but whether they be ſlight, or conſiderable; whether immediately alarming or not; they are always, and uniformly, ſuch as indicate preſſure made on the brain and nerves, viz. ſtupidity, drowſineſs, diminution or loſs, of ſenſe, ſpeech, and voluntary motion.

This every practitioner knows to be one frequent conſequence of blows on the head. But it alſo often happens, from the ſame kind of violence, that ſome of the ſmall veſſels which carry on the circulation between the pericranium, ſkull, and dura mater, are ſo damaged, as not to be able, properly to execute that office, although there are none ſo broken, as to cauſe an actual effuſion of blood.

Smart, and ſevere ſtrokes, on the middle part of the bones, at a diſtance from the ſutures, are moſt frequently followed by this kind of miſchief: the coats of the ſmall veſſels, which ſuſtain the injury inflame,

ſmall quantity of extravaſated fluid, will produce the moſt alarming and moſt preſſing ſymptoms; and that at other times a large quantity will occaſion none at all.

ſlame, and become ſloughy, and in conſequence of ſuch alteration in them, the pericranium ſeparates from the outſide of that part of the bone which received the blow, and the dura mater from the inſide; the latter of which membranes, ſoon after ſuch inflammation, becomes ſloughy alſo, and furniſhes matter; which matter being collected between the ſaid membrane and the cranium, and having no natural outlet, whereby to eſcape, or be diſcharged, brings on a train of very terrible ſymptoms, and is a very frequent cauſe of deſtruction *. The effect of this kind of violence is frequently confined to the veſſels connecting the dura mater to the cranium; in which caſe the matter is external to the ſaid membrane; but it ſometimes happens, that by the force either of the ſtroke or of the concuſſion, the veſſels which

* Comment le pericrane a-t-il pû ainſi ſe detacher de l'os dans le circonference du coup? ne ſeroit ce point par l'ebranlement ou le tremouſſement de toutes les parties integrantes du crane. Si c'eſt en conſequence d'un tremouſſement pareil que nombre de filets qui attachent le pericrane au crane ſe ſont detachés, par la meme raiſon, pluſieurs des filets qui attachent la dure mére au crane ont dû ſe rompre auſſi: d'où s'en eſt ſuivi un eryſipéle, qu'occaſion ſuppuration, ou plutot pourriture. LE DRAN.

which paſs between, and connect the two meninges, are injured in the ſame manner; in which caſe the matter formed in conſequence of ſuch violence, is found on the ſurface of the brain, or between the pia and dura mater, as well as on the ſurface of the latter; or perhaps in all theſe three ſituations at the ſame time.

The difference of this kind of diſeaſe, from either an extravaſation of blood, or a commotion of the medullary parts of the brain, is great and obvious. All the complaints produced by extravaſation, are, (as I have already ſaid) ſuch as proceed from preſſure, made on the brain and nerves, and obſtruction to the circulation of the blood through the former; ſtupidity, loſs of ſenſe and voluntary motion, laborious and obſtructed pulſe, and reſpiration, &c. and, (which is of importance to remark,) if the effuſion be at all conſiderable, theſe ſymptoms appear immediately, or very ſoon after the accident.

The ſymptoms attending an inflamed, or ſloughy, ſtate of the membranes, in conſequence of external violence* are very different.

* The difference between theſe two effects of external violence, was very well underſtood by Berengarius Carpenſis,

rent. They are all of the febrile kind; and never, at firſt, imply any unnatural preſſure: ſuch are, pain in the head, reſtleſsneſs, want of ſleep, frequent and hard pulſe, hot and dry ſkin, fluſhed countenance, inflamed eyes, nauſea, vomiting, rigor; and toward the end convulſion, and delirium. And none of theſe appear at firſt; that is, immediately after the accident; ſeldom until ſome days are paſt *.

One

penſis, a moſt excellent writer on this ſubject, who ſays, "Interdum etiam a contuſione non rumpitur aliqua "vena, ſed rumpuntur ligamenta illa duræ matris; a "quibus reſudat aliquid: hiſce vero niſi ſuccuratur, "accidunt ſæva accidentia, & mors."

Paulus Ægineta has alſo very particularly diſtinguiſhed between that degree of contuſion, which affects only the outer table of the ſkull, and that which injures the dura mater. "Porro contuſionis hujus duæ exiſtunt "differentiæ: vel enim calva per totam ipſius craſſitiem "contunditur; ut frequenter etiam cerebri membrana "abſceſſu occupetur, vel," &c.

* "Nulla autem harum contuſionum aſpectu dignoſci "poteſt; qualis nempe, quantave ſit. Non protinus "ab ictu malum ſe videndum præbet." Hippocrat.

"Sed accidentia quæ ſequuntur ad prædictam con"tuſionem, *inter commiſſuras*, non ſunt per contuſi"onem tantum; ſed ſunt per *putrefactionem panniculi* "*læſi*, et cum venit ad certam quantitatem determina"tam incipit febris, et alia accidentia: & tandem ſe"quitur mors, niſi cito ſuccuratur."

Jacobus Berengarius Carpensis.

One ſet or claſs of ſymptoms are produced by an extravaſated fluid, making ſuch preſſure on the brain, and origin of the nerves, as to impair or aboliſh voluntary motion and the ſenſes; the other is cauſed by the inflamed, or putrid ſtate of the membranes covering the brain; and ſeldom affects the organs of ſenſe, until the latter end of the diſeaſe; that is until a conſiderable quantity of matter is formed, which matter muſt preſs like any other fluid.

I am very ſenſible that it is a generally received opinion, that blood ſhed from its veſſels, and remaining confined in one place, will become pus; and that the matter found on the ſurface of the dura mater, toward the end of theſe caſes, was originally extravaſated blood. But I apprehend both theſe poſitions to be falſe. That pure blood, ſhed from its veſſels, by means of external violence, and kept from the air; will not turn to, or become matter, is (I think) proved inconteſtibly, by every day's experience, in many inſtances; in aneuriſms by puncture; in retained menſes, by imperforate vaginæ; and in all ecchymoſes. True pus cannot be made from blood merely; as may be known from the manner in

which

which all abſceſſes are formed, and from every circumſtance attending ſuppuration; and that the matter, found on the ſurface of the dura mater, after great contuſions of the head, never was mere blood, I am as certain, as obſervation, and experience can make me.

Some of the French writers have indeed divided the ſymptoms of what they call a contuſion of the head, into two kinds; and have named them *primitive* or *original* ſymptoms; and *ſecondary* or *conſequential* ones: among the former, they rank immediate loſs of ſenſe, hæmorrhage, involuntary diſcharge of urine and fæces, great propenſity to ſleep, &c. among the latter they reckon fever, delirium, rigor, convulſion, &c. One kind they impute to the mere extravaſation of blood, the other to its putrefaction.

This account, though ingenious and ſpecious, is not founded on fact. It is true, that the two kinds of ſymptoms are very diſtinct from each other, as well in their nature, as in their time and manner of acceſs; and ſo far the remark is true; but from all the obſervation and examination which I have been able to make, both on

the living and on the dead, they appear to me to proceed from very different cauſes. That both theſe kinds of ſymptoms do now and then concur in the ſame patient, is beyond all doubt; and that the caſe is thereby rendered complex, and more difficult to be judged of; but this does not conſtantly happen; and even when it does, I cannot help thinking, that there are generally ſuch diſtinguiſhing characteriſtic marks of each, as may prove the truth of what I have aſſerted.

In order to explain my meaning as clearly as I can, I will conſider the inflammatory effect of contuſion by itſelf, and independent of every other complaint or injury, which may accidentally be joined with it.

If there be neither fiſſure nor fracture of the ſkull, nor extravaſation, nor commotion underneath it, and the ſcalp be neither conſiderably bruiſed, nor wounded, the miſchief is ſeldom diſcovered, or attended to for ſome few days. The firſt attack is, generally, by pain in the part which received the blow. This pain, though beginning in that point, is ſoon extended all over the head, and is attended with a languor, or dejection of ſtrength and ſpirits, which

which are ſoon followed by a nauſea, and inclination to vomit, a vertigo or giddineſs, a quick and hard pulſe, and an incapacity of ſleeping, at leaſt quietly. A day or two after this attack, if no means preventative of inflammation are uſed, the part ſtricken generally ſwells, and becomes puffy, and tender, but not painful; neither does the tumor riſe to any conſiderable height, or ſpread to any great extent. If this tumid part of the ſcalp be now divided, the pericranium will be found of a darkiſh hue, and either quite detached, or very eaſily ſeparable from the ſkull; between which and it, will be found a ſmall quantity of a dark-coloured ichor.

If the diſorder has made ſuch progreſs, that the pericranium is quite ſeparated and detached from the ſkull, the latter will even now be found to be ſomewhat altered in colour from a ſound, healthy bone. Of this alteration it is not very eaſy to convey an idea by words; but it is a very viſible one, and what ſome very able writers have noticed *.

From

* Among theſe Fallopius particularly: "Inſpiciatis "diligenter os detectum: quod os, quando eſt in natura

 "ſua,

From this time the ſymptoms generally advance more haſtily and more apparently, the fever increaſes, the ſkin becomes hotter, the pulſe quicker and harder, the ſleep more diſturbed, the anxiety and reſtleſſneſs more fatiguing, and to theſe are generally added irregular rigors, which are not followed by any critical ſweat, and which inſtead of relieving the patient, add conſiderably to his ſufferings. If the ſcalp has not been divided or removed, until the ſymptoms are thus far advanced, the alteration of the colour of the bone will be found to be more remarkable; it will be found to be whiter, and more dry, than a healthy one, or, as Fallopius has very juſtly obſerved, it will be found to be more like a dead bone. The ſanies, or fluid, between it and the pericranium will alſo, in this ſtate, be found to be more in quantity, and

"ſua, eſt coloris ſubrubri, non candidi prorſus, nec rubri prorſus, ſed eſt veluti color miſtus ex albo declinans ad rubicundum, ut ſi multo lacte, aut alio colore candido, poneres parum ſanguinis vel alterius rei rubræ. Sed ſi videritis inæqualitatem coloris in ipſo oſſe detecto, ita ut adſint veluti puncta coloris albi, et aridi oſſis, quæ aridæ particulæ aliquando majores ſunt, aliquando minores, &c. ſciatis quod os ſit contuſum."

FALLOPIUS

and the ſaid membrane will have a more livid, diſeaſed aſpect.

In this ſtate of matters, if the dura mater be denuded, it will be found to be detached from the inſide of the cranium; to have loſt its bright ſilver hue, and to be, as it were, ſmeared over with a kind of mucus, or with matter, but not with blood. Every hour after this period, all the ſymptoms are exaſperated, and advance with haſty ſtrides: the head-ach and thirſt become more intenſe, the ſtrength decreaſes, the rigors are more frequent; and at laſt convulſive motions, attended in ſome with delirium, in others with paralyſis, or comatoſe ſtupidity, finiſh the tragedy *.

If

* The whole proceſs of this very terrible diſeaſe is very accurately related, and very juſtly accounted for, by Theodoric.

" Si vero ob ictus vehementiam, dura mater ab oſſe " fuerit ſeparata: vel aliquo modo læſa (ſano & illæſo " exiſtente cranio) ſic cognoſces: cum dolor capitis, " & lenta ebris, ſingulis diebus augmentantur, oculo- " rum anguli, ac ſi ſpaſmari vellent, diſtorquentur; " genæ rubent; (quod ſignum pravum eſt in qualibet " capitis læſione;) pannus balneatus ſuperpoſitus, ci- " tius deſiccatur; cutis etiam arida & ſicca; & ſi vul- " nus fuerit, & os diſcoopertum, color oſſis velocius " alteratur; & propter negligentiam curæ, ægro ſu-

If the ſcalp has not been divided, or removed 'till this point of time, and it be done now, a very offenſive diſcoloured kind of fluid will be found lying on the bare cranium, whoſe appearance will be ſtill more unlike to the healthy natural one; if the bone be now perforated, matter will be found between it and the dura mater generally in conſiderable quantity, but different in different caſes and circumſtances. Sometimes it will be in great abundance, and diffuſed over a very large part of the membrane; and ſometimes the quantity will be leſs,

" perveniunt dolores, & febres, ſpaſmus, ſyncope, & " permiſtio rationis."

THEODOR. de vuln. capit.

" Qua vero ſuper cerebri membranam ſit, utraqua ra- " tione difficilis eſt: nam læſis membranis apparet; ideo " enim febris cum horrore, accedunt faciei rubor, & " calor, longe major quam pro febris modo; ſomnique " tumultuoſi; oculi ſubpingues, & gramioſi & rubentes."

ARCHIGENES. de ſanguine ſubtercurrent.

Petrus e Largelata, having very accurately related the ſymptoms attending the formation of matter under the cranium when fractured, ſays: " Si autem fractura ſit " parva & penetrans, tunc fiunt illa ſigna poſt aliquod " tempus; eo quod tunc humiditates quæ ſunt ſub cra- " nio putrefiunt; & tunc fiunt illa accidentia:" And then very juſtly adds, " Secundo notes quod omnia illa " accidentia poſſunt advenire ex percuſſione capitis, cra- " nio non fracto." PET. e LARGELATA.

leſs, and conſequently the ſpace which it occupies ſmaller. Sometimes it lies only on the exterior ſurface of the dura mater; and ſometimes it is between it and the pia mater; or alſo even on the ſurface of the brain, or within the ſubſtance of it.

The primary and original cauſe of all this, is the ſtroke upon the ſkull; by this the veſſels which ſhould carry on the circulation between the ſcalp, pericranium, ſkull, and meninges, are injured; and no means being uſed to prevent the impending miſchief, or ſuch as have been made uſe of proving ineffectual, the neceſſary and mutual communication between all theſe parts ceaſes; the pericranium is detached from the ſkull, by means of a ſanies diſcharged from the ruptured veſſels; the bone, being deprived of its due nouriſhment and circulation, loſes its healthy appearance; the dura mater, (its attaching veſſels being deſtroyed, or rendered unfit for their office) ſeparates from the inſide of the cranium, inflames and ſuppurates.

Whoever will attend to the appearances which the parts concerned make in every ſtage of the diſeaſe, to the nature of the ſymptoms, the time of their acceſs, their

progreſs, and moſt frequent event, will find them all eaſily and fairly deducible from the one cauſe, which has juſt been aſſigned, viz. the contuſion. As the inflammation, and ſeparation of the dura mater, is not an *immediate* conſequence of the violence, ſo neither are the ſymptoms immediate; ſeldom until ſome days have paſſed; the fever at firſt is ſlight, but increaſes gradually; as the membrane becomes more and more diſeaſed, all the febrile ſymptoms are heightened, the formation of matter occaſions rigors, frequent and irregular, until ſuch a quantity is collected, as brings on delirium, ſpaſm, and death.

Hitherto I have conſidered this diſeaſe, as unaccompanied by any other, not even by any external mark of injury, except perhaps a trifling bruiſe of the ſcalp; let us now ſuppoſe the ſcalp to be wounded at the time of the accident, by whatever gave the contuſion: or let us ſuppoſe, that the immediate ſymptoms having been alarming, a part of the ſcalp had been removed, in order to examine the ſkull; in ſhort, let the injury be conſidered as joined with a wounded ſcalp.

In

In this caſe, the wound will for ſome little time have the ſame appearance as a mere ſimple wound of this part, unattended with other miſchief, would have; it will, like that, at firſt diſcharge a thin ſanies, or gleet, and then begin to ſuppurate; it will digeſt, begin to incarn, and look perfectly well. But, after a few days, all theſe favourable appearances will vaniſh; the ſore will loſe its florid complexion and granulated ſurface, will become pale, glaſſy, and flabby; inſtead of good matter, it will diſcharge only a thin diſcoloured ſanies; the lint with which it is dreſſed, inſtead of coming off eaſily, (as in a kindly ſuppurating ſore) will ſtick to all parts of it; and the pericranium, inſtead of adhering firmly to the bone, will ſeparate from it, all round, to ſome diſtance from the edges.*

This

* "Ubicunque autem ex vulnere intereundum ſit, neque poſſit homo ſanitatem recipere, neque ſervari, ex his intelligere convenit moriturum; id quod futurum eſt prognoſticare. Hyeme plerumque, ante diem quartum, æſtate poſt ſeptimum, accedit febris; quæ quum ſupervenit, vulnus reddit non ſui coloris & ſaniem modicam effundit, quodque ex ipſo inflammatum eſt emoritur, glutinoſum efficitur, & carnem ſale conditam repræſentat. Hippocrates de vuln. capit. Ulcus neque alitur neque pus maturat, & ſordidum fit."

ARCHIGENES.

This alteration in the face and circumſtances of the ſore, is produced merely by the diſeaſed ſtate of the parts underneath the ſkull; which is a circumſtance of great importance, in ſupport of the doctrine advanced; and is demonſtrably proved, by obſerving that this diſeaſed aſpect of the ſore, and this ſpontaneous ſeparation of the pericranium, are always confined to that part which covers the altered, or injured portion of the dura mater, and do not at all affect the reſt of the ſcalp; nay, if it has by accident been wounded in any other part, or a portion has been removed from any part where no injury has been done to the dura mater, no ſuch ſeparation will happen; the detachment above will always correſpond to that below, and be found no where elſe.

The firſt appearance of alteration in the wound immediately ſucceeds the febrile attack; and as the febrile ſymptoms increaſe, the ſore becomes worſe and worſe, that is, degenerates more and more from a healthy, kindly aſpect.

Through the whole time, from the firſt attack of the fever, to the laſt and fatal period, an attentive obſerver will remark the

the gradual alteration of the colour of the bone, if it be bare: at firſt it will be found to be whiter, and more dry, than the natural one; and as the ſymptoms increaſe *, and either matter is collected, or the dura mater becomes ſloughy, the bone inclines more and more to a kind of purulent hue, or whitiſh yellow; and it may alſo be worth while in this place to remark, that if the blow was on or very near to a ſuture, and the ſubject young, the ſaid ſuture will often ſeparate in ſuch manner as to let through it a looſe, painful, ill-natured fungus; at which time alſo it is no uncommon

* "Tandem ſubpallidum vel album ſe oſtendit; ubi "autem, jam purulentum eſt, aut puſtulæ in lingua naſ- "cuntur, laborans mente non conſtante conſumitur."

HIPPOCRATES de vuln. capitis.

"Quando ſanies eſt infra cranium, *ipſo non fracto*, cra- "nium eſt male coloratum: æger ſentit gravedinem in "ea parte, qua eſt ſanies.—Eſt os ſanum, id eſt illud "cui adhæret dura mater, coloris albi, miſti rubedine.— "Et quo ſeparatio eſt major, eo major oſſis quantitas eſt "mutata in colore.---Ultra vero colorem, cognoſcitur "etiam eo quod ſiccius ſit ſano.---Et ultra colorem, & "ſiccitatem quando incipit iſta ſeparatio, incipiunt ali- "qua ſæva accidentia; & febris, mentis alienatio, ſtu- "por, vigilæ, &c. *Quia incipit ſupra panniculum ag- "gregari materia, quæ incipit corrumpi.*"

JACOBUS BERENGARIUS CARPENSIS.

mon thing for the patient's head and face to be attacked with an eryſipelas *.

I have ſaid, that in thoſe caſes, in which the ſcalp is very little injured by the bruiſe, and in which there is no wound, nor any immediately alarming ſymptoms, or appearances, that the patient feels little or no inconvenience; and ſeldom makes any complaint, until ſome few days are paſt. That at the end of this uncertain time, he is generally attacked by the ſymptoms already recited. That theſe are not preſſing at firſt, but that they ſoon increaſe to ſuch a degree, as to baffle all our art; from whence it will appear, that when this is the caſe, the patient frequently ſuffers from what ſeems at firſt to indicate his ſafety, and prevents ſuch attempts being made, and ſuch care from being taken of them, as might prove preventative of miſchief.

But if the integuments are ſo injured as to excite or claim our early regard, very uſeful information may from thence be collected; for whether the ſcalp be conſiderably bruiſed, or whether it be found neceſſary to divide it, for the diſcharge of extra-

* "Suturas tempore curationis disjungi grave eſt."
ARCHIGINES DE SIGNIS.

extravaſated blood; or on account of worſe appearances, or more urgent ſymptoms, the ſtate of the pericranium may be thereby ſooner, and more certainly known; if in the place of ſuch bruiſe, the pericranium be found ſpontaneouſly detached from the ſkull; having a quantity of diſcoloured ſanies between them, under the tumid part, in the manner I have already mentioned; it may be regarded as a pretty certain indication, either that the dura mater is beginning to ſeparate in the ſame manner; or that if ſome preventative means be not immediately uſed, it will ſoon ſuffer; that is, it will inflame, ſeparate from the ſkull, and give room for a collection of matter between them. And with regard to the wound itſelf, whether it was made at the time of the accident, or afterward artificially, it is the ſame thing; if the alteration of its appearance be as I have related, if the edges of it ſpontaneouſly quit their adheſion to the bone, and the febrile ſymptoms are at the ſame time making their attack, theſe circumſtances will ſerve to convey the ſame information, and to prove the ſame thing *. This

* " Si dans une playe contuſe, où le crane eſt decou-
" vert, on trouve à la circonference de la playe, que le
pericrane

This particular effect of contuſion is frequently found to attend on fiſſures, and undepreſſed fractures of the cranium; as well as on extravaſations of fluid, in caſes where the bone is entire: and, on the other hand, all theſe do often happen without the concurrence of this individual miſchief. All this is matter of accident; but let the other circumſtances be what they may, the ſpontaneous ſeparation of the altered pericranium, in conſequence of a ſevere blow, is almoſt always followed by a ſuppuration between the cranium and dura mater, a circumſtance extremely well worth attending to in fiſſures and undepreſſed fractures of the ſkull; becauſe, it is from this circumſtance principally, that the bad ſymptoms, and the hazard, in ſuch caſes ariſe.

It is no very uncommon thing for a ſmart blow on the head to produce ſome immediate bad ſymptoms; which after a ſhort ſpace of time diſappear, and leave the patient perfectly well. A ſlight pain in the head,

" pericrane tienne peu à crane, ou en ſoit detachè, c'eſt " une preuve certaine que le crane a ſouffert, quoiqu'il " ne ſoit fracturé; & s'il a ſouffert, on peut être aſſuré " que la dure mere a ſouffert auſſi." Le Dran.

head, a little acceleration of pulſe, a vertigo and ſickneſs ſometimes immediately follow ſuch accident, but do not continue many hours; eſpecially, if any evacuation has been uſed. Theſe are not improbably owing to a ſlight commotion of the brain; which, having ſuffered no material injury thereby, ſoon ceaſe. But if after an interval of ſome time, the ſame ſymptoms are renewed; if the patient, having been well, becomes again feveriſh, and reſtleſs, and that without any new cauſe; if he complains of being languid and uneaſy, ſleeps diſturbedly, loſes his appetite, has a hot ſkin, a hard quick pulſe, and a fluſhed, heated countenance, and neither irregularity of diet, nor accidental cold, have been productive of theſe, miſchief is moſt certainly impending, and that moſt probably under the ſkull.

If the ſymptoms of preſſure; ſuch as ſtupidity, loſs of ſenſe, voluntary motion, &c. appear ſome few days after the head has ſuffered injury from external miſchief, they do moſt probably imply an effuſion of a fluid ſomewhere: this effuſion may be in the ſubſtance of the brain, in its ventricles, between its membranes, or on the ſurface

of

of the dura mater: and which of theſe is the real ſituation of ſuch extravaſation is a matter of great uncertainty; none of them being attended with any peculiar mark, or ſign that can be depended upon, as pointing it out preciſely; but the inflammation of the dura mater, and the formation of matter between it and the ſkull, in conſequence of contuſion, is generally indicated and preceded by one which I have hardly ever known to fail; I mean a puffy, circumſcribed, indolent tumor of the ſcalp, and a ſpontaneous ſeparation of the pericranium, from the ſkull under ſuch tumor *.

Theſe appearances therefore following a ſmart blow on the head, and attended with languor, pain, reſtleſsneſs, watching, quick pulſe, head-ach, and ſlight, irregular ſhiverings, do almoſt infallibly indicate an inflamed

* Lorſqu' on trouve le pericrane detaché, il n'y a point a heſiter a faire le trepan. Je ſçais que dans un cas pareil on n'auroit rien trouvé d'epanché ſous le crane, mais cependant l'operation faite de bonne heure auroit été l'unique moyen de ſauver le malade s'il etoit poſſible, &c.

Si donc pluſieurs experiences nous apprennent que la dure mere devient malade en conſequence de la contuſion de l'os, & que ſa maladie degenere en pourriture, ce que a juſqu'ici emporte pluſieurs malades malgré de recours uſités, il faut abſolument trepanner de bonne heure.

Le Dran.

flamed dura mater, and pus, either forming or formed between it and the cranium *.

By detachment of the pericranium, I do not mean every ſeparation of it from the bone which it ſhould cover. It may be, and often is, cut, torn, or ſcraped off, without any ſuch conſequence: but theſe ſeparations are violent; whereas, that which I mean is ſpontaneous, and is produced by the deſtruction of thoſe veſſels, by which it was connected with the ſkull, and by which the communication between it, and the internal parts was carried on; and therefore it is to be obſerved, that it is not the mere removal of that membrane which cauſes the bad ſymptoms, but it is the inflammation of the dura mater; of which inflammation, this ſpontaneous ſeceſſion of the

* Si ſtatim ab initio febris primo aut ſecundo appareat die, illa proculdubio cauſam agnoſcat perturbationem humorum, ac animi, quum vulnus incuteretur; ceſſante cauſa procatarctica; ac ubi ſe collegerit æger, deſinat illa febricula. Si vero primis diebus, nihil febrile, nec ullum ſymptoma ſentiat æger, ſeque in nullo diſcrimine exiſtimat, hunc ſi ſubito, die ſcilicet ſeptimo, vel quartodecimo (nihil licet in victu, rebuſve externis peccaverit æger) ac præter expectationem febris invadat, ſignificat latens aliquod, in cranio, cerebro, aut corpore vulnerati.

PET. PAAW. in HIPPOCRAT.

the pericranium is an almoſt certain indication.

A falſe notion prevailed for many years, that the dura mater was not in general connected with the internal ſurface of the ſkull, except at the ſutures; and that in all other parts of it, ſuch a vacancy was left, as gave free room for what they called its pulſatory motion *. This opinion, which was embraced

* If we conſider how clearly and plainly many of the beſt antient writers deſcribe the intimate connexion between the ſkull and dura mater; and how perfectly well acquainted many of them were with its morbid ſeparation; we ſhall wonder how it came to be again forgot; but that it was is moſt certain. In Hippocrates, Paulus Ægineta, Rhazes, and others, are many paſſages which prove their knowledge of the natural ſtructure and adheſion of this membrane; and that ſome of the moſt eminent writers, and practitioners, had forgot, or did not attend to it, the following quotations, ſelected from many more, may evince.

" Dura mater calvariæ connectitur ſuturarum ope ut " penſile & erectum teneat cerebrum; tum etiam ut per " ſuturas egreſſa pericranium procreat: ſpatium vero inter " ſuturas recte natura liberum reliquit ut vacuum quod- " dam eſſet inter duram matrem & calvariam; has nimi- " rum ob cauſas; primo ne quicquam cerebri ſyſtolæ & " diaſtolæ obſtaret; ſecundo ne venæ, & arteriæ per ex- " ternam duræ matris partem ſparſæ levi aliquo ictu in " cranio facto rumperentur; poſtremo ut ruptis in dura " mater venis, ſanguis non inter duram & piam matrem, " ſed inter duram & cranium effunderetur, & cranio per- " forato

braced by many, even of the moſt eminent practitioners, was the principal reaſon, why the bad effects of contuſions of the head were ſo little underſtood, and ſo groſſly miſtreated by them. They ſuppoſed that

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" forato facilius extraheretur. Et hic eſt ordinarius na-
" turæ ordo." GUL. FAB. HILDANUS.

Felix Wirtz ſays, that the elevation of the cranium in ſlight impreſſions is needleſs, " Id enim motum cerebri, " propter *vacuum* & diſtantiam quæ eſt inter meningem " & cranium, minime impedire." And Hildanus, by way of reproof to what Felix Wirtz ſays: " Aliquando " duram matrem cranio undique adhærere vidimus."

Fallopius, ſpeaking of the dura mater, ſays: " Con-
" tinuo pulſat, quare non facile ſanatur."

Petrus e Marchetti ſuppoſed the dura mater always to be at a diſtance from the ſkull in thoſe who were bald. Speaking of the treatment of a particular caſe he ſays: " Poſt ſeptimam nempe oleum hyperici, quia calvus erat " patiens atque membrana a calvaria diſtabat; quod in " calvis ſemper obſervavi."

PET. e MARCHETTI Obſ. Chir.

" Aliquando contingit ut dura mater cranio ſatis fir-
" miter adhæreat, ſed hæc *admodum raro evenire ſolet*,
" *atque præter naturæ* conſuetudinem eſt."

MUYS Prax. Rat. Chirurg.

This was alſo the opinion of Sylvius, Pacchioni, Ambroſe Paré, Serjeant Wiſeman, Baglivi, Barbette, and of all thoſe who maintained the doctrine of the oſcillation of the dura mater; and who believed that that membrane was found ſometimes higher, ſometimes lower, that is, ſometimes nearer to, ſometimes farther from the ſkull, at one age, and at one time of the moon, than another.

the vacuity between the dura mater and cranium, was ſufficient, in general, to defend the former from all external violence: and the blood and matter, ſo often found between them, were thought to be depoſited in a ſpace naturally vacant. Upon this principle ſtood both their opinion and practice; and therefore it is not to be wondered at, that their accounts, in general, are ſo perplexed, and ſo ſeldom verified by the examination of dead ſubjects.

It ſometimes happens, that the ſcalp is ſo wounded at the time of the accident; or ſo torn away, as to leave the bone perfectly bare, and yet the violence has not been ſuch, as to produce the evil I am now ſpeaking of. In this caſe, if the pericranium be only turned back, along with the detached portion of ſcalp, there may be probability of its re-union; and it ſhould therefore be immediately made clean and replaced, for the purpoſe of ſuch experiment, which, if it ſucceeds, will ſave much time, and prevent conſiderable deformity. If this attempt does not ſucceed, the detached piece may be removed; and the caſe then becomes, as if the ſcalp and the pericranium had been forced away, at the time that the wound

was

was firſt inflicted; and the worſt that can happen, is an exfoliation from the bare ſkull.*

It does alſo ſometimes happen, that the force which detaches or removes the ſcalp, does alſo occaſion the miſchief in queſtion; but the integument being wounded, or removed, we cannot have the criterion of the tumor of the ſcalp, for the direction of our judgment. In theſe circumſtances our whole attention

* Not that exfoliation is the neceſſary conſequence of the ſkull being laid bare: this depends upon other circumſtances, beſides the mere removal of the ſcalp, and pericranium. The ſolidity of the ſurface of the bones, the ſize of the veſſels, and the impulſe of the blood through them, are what principally determine that. If the cortex of the bone be not very hard, and the impulſe of the blood be capable of counterbalancing the effects of the external air, a granulation of fleſh will be generated on the ſurface of the bone, which will cover, and firmly adhere to it, without throwing off the ſmalleſt exfoliation; eſpecially in young ſubjects. On the contrary, if the bone be much hardened, and the veſſels thereby conſtringed; or if ſuch applications be made uſe of, as will produce an artificial conſtriction of them, the ſurface will neceſſarily become dry, and the juices ceaſing to circulate through it, it muſt part with a ſcale to a certain depth; that is, that part of the ſurface through which the circulation ceaſes to be carried on, will be ſeparated from, and caſt off by, the veſſels which nouriſh the reſt of the bone.

attention muſt, (as I have already ſaid) be directed to the wound and general ſymptoms. The edges of the former will, (as I have already obſerved) digeſt as well, and look as kindly, for a few days, as if no miſchief was done underneath; but after ſome little ſpace of time, when the patient begins to be reſtleſs, and hot, and to complain of pain in the head, theſe edges will loſe their vermillion hue, and become pale and flabby; inſtead of matter they will diſcharge a thin gleet, and the pericranium will looſen from the ſkull, to ſome diſtance from the ſaid edges. Immediately after this, all the general ſymptoms are increaſed, and exaſperated, and as the inflammation of the membrane is heightened, or extended, they become daily worſe and worſe, until a quantity of matter is formed, and collected, and brings on that fatal period, which, though uncertain as to date, very ſeldom fails to arrive.

The method of attempting the relief of this kind of injury conſiſts in two points, viz. to endeavour to prevent the inflammation of the dura mater; or, that being neglected, or found impracticable, to give diſcharge to the fluid collected within

the

the cranium, in conſequence of ſuch inflammation.

Of all the remedies in the power of art, for inflammations of membranous parts, there is none equal to phlebotomy. To this truth many diſeaſes bear teſtimony; pleuriſies, opthalmies, ſtrangulated hernias, &c. and if any thing can particularly contribute to the prevention of the ills likely to follow ſevere contuſions of the head, it is this kind of evacuation; but then it muſt be made uſe of in ſuch a manner as to become truly a preventative; that is, it muſt be made uſe of immediately, and freely.

I am very ſenſible, that it will in general be found very difficult to perſuade a perſon, who has had what may be called only a knock on the pate, to ſubmit to ſuch diſcipline, eſpecially, if he finds himſelf tolerably well. He will be inclined to think, that the ſurgeon is either unneceſſarily apprehenſive, or guilty of a much worſe fault; and yet, in many inſtances, the timely uſe, or the neglect, of this ſingle remedy, makes all the difference between ſafety, and fatality.

It may be ſaid, that as the force of the blow, the height of the fall, the weight of

the inſtrument, &c. can never preciſely or certainly determine the effect, nor inform us whether miſchief is done under the bone or not, a large quantity of blood may be drawn off unneceſſarily, in order to prevent an imaginary evil. This is in ſome degree true; and if the advice which I have juſt given was univerſally followed, many people would be largely bled without neceſſity; but then, on the other hand, many a very valuable life would be preſerved, which for want of this kind of aſſiſtance is loſt. "Nihil intereſt, præſidium an ſatis tutum ſit, "quod unicum eſt," is an inconteſted maxim in medicine; and if it be allowed to uſe ſuch means, as may be in themſelves hazardous, ſurely it cannot be wrong to employ one which is not ſo; at leaſt, if it be conſidered in a general ſenſe; whatever it may accidentally prove to ſome few particular individuals.

Acceleration, or hardneſs of pulſe, reſtleſſneſs, anxiety, and any degree of fever, after a ſmart blow on the head, are always to be ſuſpected and attended to. Immediate, plentiful, and repeated evacuation by bleeding, have, in many inſtances removed theſe, in perſons to whom, I do verily be-

lieve,

lieve, very terrible miſchief would have happened, had not ſuch precaution been uſed. In this, as well as ſome other parts of practice, we neither have, nor can have any other method of judging, than by comparing together caſes apparently ſimilar. I have more than once or twice ſeen that increaſed velocity and hardneſs of pulſe, and that oppreſſive languor which moſt frequently precede miſchief under the bone, removed by free and repeated blood-letting; and have often, much too often, ſeen caſes end fatally, whoſe beginnings were full as ſlight, but in which ſuch evacuation had been either neglected or not complied with.

I would by no means be thought to infer from hence, that early bleeding will always prove a certain preſervative; and that they only die to whom it has not been applied: this, like all other human means, is fallible, and perhaps there are more caſes out of its reach, than within it; but where preventative means can take place, this is certainly the beſt, and the moſt frequently ſucceſsful.

The ſecond intention, viz. the diſcharge of matter collected under the cranium, can be anſwered only by the perforation of it.

When, from the ſymptoms and appearances already deſcribed, there is juſt reaſon for ſuppoſing matter to be formed under the ſkull, the operation of perforation cannot be performed too ſoon; it ſeldom happens that it is done ſoon enough *.

The propriety or impropriety of applying the trephine, in caſes where there is neither fiſſure, fracture, nor ſymptom of extravaſation, is a point which has been much litigated, and remains ſtill unſettled either by writers or practitioners.

When there is no reaſon for ſuſpecting either of thoſe injuries, either from the ſymptoms, or from the appearances; and the pericranium, whether the ſcalp be wounded or not, remains firmly attached in all parts to the ſkull, there certainly is not, (let the general ſymptoms be what they may) any indication where to apply the inſtrument; and conſequently no ſufficient authority for uſing it at all. But whenever

* "His, ubi cito manus admoveatur, ſalutis aliqua "ſpes ſubeſt; ubi ſerius, plerique omnes moriuntur."
ARCHIGINES.

ever that membrane, after the head has received an external violence, ſeparates, or is detached ſpontaneouſly from the bones underneath it; and ſuch ſeparation is attended with the collection of a ſmall quantity of thin, brown ichor, an alteration of colour in the ſeparated pericranium, and an unnatural drineſs of the bone, I cannot help thinking, that there is as good reaſon for trepanning, as in the caſe of fracture; I believe experience would vindicate me, if I ſaid, better reaſon; ſince it is by no means infrequent, for the former kind of caſe to do well without ſuch operation; whereas the latter (I mean ſuppuration under the ſkull) never can *.

All the beſt practitioners have always agreed in acknowledging the neceſſity of perforating the ſkull in the caſe of a ſevere ſtroke made on

* "Les auteurs juſqu'ici, ne nous ont parlé du trepan "qu' autant qu' il pouvoit ſervir a relever des pieces du "crane enfoncées, par un coup violent, ou a donné "iſſue a quelque liqueur, comme ſeroit du ſang, ou du "pus, epanché, ſous le crane.

"La contuſion de l'os eſt un cas, ou le trepan n'eſt pas "moins neceſſaire; non a cauſe que l'os eſt contus, mais "pour prevenir la maladie de la dure mére, & de la pie "mere; qui en eſt une ſuite preſque indiſpenſable."

LE DRAN.

on it, by gun-ſhot, upon the appearance of any threatening ſymptoms, even though the bone ſhould not be broken: and very good practice it is. A wound by gun-ſhot, (as far as it relates to the ſkull) is to be regarded only as one attended with a very high degree of contuſion; and therefore moſt likely to produce ſymptoms accordingly; among which, inflammation of the dura mater ſtands principal. Experience confirms both; moſt of the ſymptoms, attending wounds of the head, made by gun-ſhot, are ſymptoms of contuſion: and the formation of matter between the cranium and dura mater, is a very frequent, and a very fatal conſequence of ſuch contuſion.

In ſhort; the ſpontaneous ſeparation of the pericranium, if attended with general diſorder of the patient, with a chilline ſs, horripilatio, languor, and ſome degree of fever, appears to me, from all the obſervation I have been capable of making, to be ſo ſure and certain an indication of miſchief underneath, either in preſent, or impending, that I ſhould never heſitate about perforating the bone in ſuch circumſtances.

When

When the ſkull has been once perforated, and the dura mater thereby laid bare; the ſtate of the latter muſt principally determine the ſurgeon's future conduct. In ſome caſes, one opening will prove ſufficient for all neceſſary purpoſes, in others ſeveral may be neceſſary. This variation will depend on the ſpace of detached dura mater, and the quantity of collected matter. The repetition of the operation is warranted, both by the nature of the caſe, and by the beſt authorities, there being no compariſon to be made between the poſſible inconvenience ariſing from largely denuding the dura mater, and the certain, as well as terrible evils, which muſt follow the formation and confinement of matter between it and the ſkull.

It can hardly be neceſſary for me to obſerve, to whoever reflects ever ſo little on the true nature of theſe caſes, that notwithſtanding the operation of perforation be abſolutely and unavoidably neceſſary, yet the repetition of blood-letting, of cooling laxative medicines, the uſe of antiphlogiſtic remedies, and a moſt ſtrict obſervance of a low diet and regimen, are as indiſpenſably requiſite, after ſuch operation, as before:

fore: the perforation ſets the membrane free from preſſure, and gives vent to collected matter, but nothing more: the inflamed ſtate of the parts under the ſkull, and all the neceſſary conſequences of ſuch inflammation, call for all our attention, full as much afterwards as before: and although the patient muſt have periſhed without the uſe of the trephine, yet the merely having uſed it will not preſerve him, without every other caution and care.

This being all that our art is capable of doing in theſe melancholy caſes, I wiſh I could ſay, that it was moſt frequently ſucceſsful. Sometimes it is: the operation, conſidered abſtractedly, is not in itſelf hazardous, and is the unicum remedium, for the moſt immediately impending, and moſt threatening miſchief; ſome have been ſaved by it; none can eſcape without it; as there are no certain indications, no criteria, whereby we are enabled to judge, whether it will prove ſucceſsful, or not, the event of each individual caſe can alone determine. When that is happy, the means are very juſtly commended; but when it is not ſo, they ought not therefore to be condemned;

demned; ſince they are built on very rational principles, and are the only means in human power.

CASE I.

A Poor fellow croſſing Tower-hill, got, before he was aware of it, into a mob, that was endeavouring to reſcue a ſailor from a preſs-gang. The man was knocked down. When the croud diſperſed, he was found ſenſeleſs, and in that ſtate was brought to St. Bartholomew's hoſpital; where he was immediately let blood, and put to bed. In an hour or two, he was ſo recovered, as to be able to give the preceding account.

When Mr. Nourſe (whoſe week it was for accidents) ſaw him the next day, the man appeared to be perfectly well; nor did any mark of violence appear on his head, except one ſmall bruiſe; and that ſo ſlight, that it might, with more probability, be attributed to the fall, than the blow. However, as he was poſitive, that he had been knocked down, by a very ſmart blow, from a heavy weapon; and as he certainly had

been

been deprived of ſenſe a conſiderable time thereby; Mr. Nourſe bled him again, and ordered him to be kept in bed, and to a very low diet. At the end of three days the man found himſelf ſo well, as to leave the hoſpital, and go to work. On the twelfth day from that of the accident, he came to my ſurgery, and complained of being much out of order; ſaid, that his head was very uneaſy; that he was hot, thirſty, got little or no ſleep, and was, at times, ſo faint that he could not purſue his labour. He looked ill, aſſured me he had lived very ſoberly, from the time of his leaving the hoſpital, and that he had been in his preſent ſtate for three days paſt. I took him into the houſe again, bled him, ordered him a glyſter immediately, and that he ſhould be kept in bed.

Next day, (13th) he was in much the ſame ſtate as the preceding: he had paſſed a reſtleſs night, had doſed now and then, but awoke with much diſturbance. He had a hot ſkin, and a fluſhed countenance, mixed with a light yellow tint; he complained of a general pain and tightneſs all over his head; but neither to the ſight, nor to the touch, was there any appearance, or

ſenſation,

ſenſation, whereon to build a probable ſuppoſition, of particular miſchief. He was again, by the phyſician's order, let blood, and directed to take the ſal abſinthii mixture, with a few grains of rhubarb in it, every ſix hours. He paſſed the enſuing night in a diſturbed manner, and the next day, (the 14th) was apparently worſe: his ſkin was hotter, his pulſe quicker, and his pain more acute; he alſo now thought, that one part of his head was tender to the touch; and ſaid, he was ſure, that was the part which received the blow. This place I examined. The ſcalp did ſeem to be rather fuller than natural, but by no means ſufficiently ſo, to enable me to form any judgment by. Toward the cloſe of this day he had a ſlight ſhivering, was ſick, and vomited, and paſſed the following night without any ſleep at all; talking ſometimes incoherently, but ſtill capable of giving a rational anſwer to any queſtion which engaged his attention. On the 15th day, the tumor of the ſcalp was more apparent, but yet ſeemed to contain little or no fluid, and was about the breadth of a crown piece. I would have removed that portion of ſcalp; but while I was intending it, the poor man

had a very ſevere rigor, which diſordered him ſo much, that he begged to be let alone for the preſent. That afternoon he had two more ſhiverings, paſſed very ill the following night; and next morning was delirious. The tumor now was more riſen, contained palpably a fluid, but was by no means tenſe; I took away the whole tumid piece, by a circular inciſion; gave diſcharge to a thin brown ſanies, and found the cranium perfectly naked, altered conſiderably in colour from that of a healthy natural one, but without fiſſure, fracture, or other evil. That whole night and next day he was delirious; his ſkin burning hot; he had frequent ſpaſms, which ſhook his whole frame, and that night (the 17th) he died.

The whole ſcalp, except round the edge of the inciſion, was in a natural ſtate; the pericranium in every other part, except the tumid one, adhered to the bone; and neither inflammation, nor tumor of any kind all over the reſt of the head. Under that part of the ſkull from which the pericranium had been detached, and from which the ſcalp had been removed, a very conſiderable collection of matter was found lying between the dura mater and cranium,

but

but no appearance of diſeaſe any where elſe.

CASE II.

Contuſion with Wound.

A Young fellow, playing at quoits, was ſtruck down by the perpendicular fall of one of them on his head. It made a large wound, which bleed freely, but did not divide the pericranium, and conſequently did not denude the ſkull. The wound was brought together by a ſtitch, made by ſomebody at hand; and the man, though ſtunned at firſt by the blow, having vomited plentifully, was ſoon well, and the next day went to his work, which was that of a farrier. The wound was dreſſed daily with a ſuperficial pledgit, by the perſon who firſt ſaw and ſtitched it; and it ſeemed to unite kindly.

On the ſixth day from that of the accident, he complained of being chilly and faint; and when he had done about half a day's work, found himſelf unable to bear the heat of the forge, or to ſtoop to ſhoe an horſe, on account of pain in his head: he therefore left his ſhop, went home, and ſent

for the apothecary who firſt had dreſſed him. The wound not being very carefully examined appeared to be healed, and therefore was not regarded as any cauſe of the man's preſent indiſpoſition, who was treated as having a fever, from cold, and irregularity: he was let blood, and took ſome medicines; but at the end of three days, (nine from the accident) being worſe, and incapable of bearing the expence of remaining at home, he was brought to St. Bartholomew's hoſpital. On the tenth day, from that on which he was wounded, I ſaw him. He had a conſiderable degree of fever; his pulſe was hard and quick, his ſkin hot and dry, his face fluſhed, his eye languid, and he complained of great pain and tightneſs all over his head. The wound was apparently, but not really healed; I could paſs a probe underneath, from one end to the other of it; and I could feel the cranium bare the whole way. I divided its whole length. I found the pericranium ſloughy, and detached to a conſiderable diſtance, and the bone much altered in colour; upon ſight whereof, I removed the whole ſeparated part, by a large circular inciſion.

From

From the ſymptoms and appearances I prognoſticated no good. He was again let blood, and had a glyſter, and a lenient purge, which together produced three ſtools. That night, (the 10th) he had a rigor, after which his pain became more intenſe, and fever higher. The next morning, (the 11th) he had another ſhivering; and when I ſaw him about noon, he was very inconſiſtent. I ſet on a trephine cloſe to the ſagittal ſuture; on one ſide; and gave diſcharge to a ſmall quantity of matter, which lay on the ſurface of the dura mater; after being lightly dreſſed, ſome more blood was drawn from one of the jugular veins, and he was ordered to take a draught of the ſalt of wormwood mixture frequently. The next day, (12th) he was worſe. I therefore ſet the trephine on again, but on the other ſide of the ſuture, and by that means let out a conſiderable quantity of matter from between the ſkull and membrane. Soon after this, he became more rational, and ſeemed to get a little ſleep; but in the evening his pain returned with great violence, and he had a rigor, which held him above an hour.

When I ſaw him the next day, (13th) he was ſenſeleſs, had a low faultering pulſe, and a profuſe cold ſweat; ſoon after which he expired.

Upon removing the upper part of the ſkull, a large quantity of matter was found, under each parietal bone, which had detached the dura mater from its connexion with the ſkull, for a conſiderable ſpace, but not at the future. On the right ſide a portion of the dura mater was become ſloughy, about the breadth of a ſhilling; and under this altered part, was matter between the two meninges.

The more firm attachment of the dura mater at the ſutures, renders the ſeparation of it at theſe places very difficult: which circumſtance, added to the conſideration of the ſituation of the ſagittal future on the very top of the head, renders the application of the trephine on each ſide of it often abſolutely neceſſary. For if there be good reaſon to ſuſpect either an extravaſation of blood, or a collection of matter, in conſequence of a blow received on this future, and one ſide only be perforated, the operation may happen to be performed on that ſide where the blood or matter does not lie,

and

and will therefore be ſucceſsleſs; or, on the other hand, the extravaſation, or ſuppuration, may be on both ſides; and then the perforation of one only cannot anſwer the whole purpoſe, and the patient will as certainly periſh as if nothing had been done at all.

CASE III.

Contuſion without Wound.

A BOY about nine years old, playing under an empty cart, whoſe ſhafts were ſupported by a ſtick, was knocked down, by the fall of one of them upon his head. The child was ſtunned by the blow for a minute or two, but ſoon became ſenſible. When he came home, there being a ſmall ſwelling where the blow had been ſtricken, his mother applied a bit of linen rag, wet with vinegar; and as he appeared to be perfectly well in a day or two, he was ſent to ſchool.

Five days paſſed over before he made any complaint; on the ſixth, he ſaid, that his head ached; he brought up his breakfaſt, and could eat no dinner; but in the evening ſeemed to be pretty well again. On the

7th, he complained ſtill more of his head; and ſaid, that he was very ſick, and very cold. He was put to bed, but got no reſt. As he had not had either ſmall-pox, or meaſles, he was brought home, and treated as if one of theſe diſeaſes was to follow.

Three days more paſſed, and no eruption appeared: the fever continued much the ſame; he was frequently inclined to vomit, and what little ſleep he got, was extremely diſturbed. He was, by the order of a phyſician, let blood, had a bliſter applied to his back, and took ſome of the common febrifuge medicines. On the 12th day, from that of the accident, he was ſeized with a ſhivering, which held him more than a quarter of an hour; after which his pain became more acute, and his fever higher. Some blood was drawn from his temples by leeches, and he was ordered ſome other medicines. On the 13th, at noon, he had another rigor, ſtill more ſevere than the former, and of longer duration; and that evening he became light headed. By ſome means or other, the accident of the blow was now mentioned to the perſon who attended him; and who deſired that a ſurgeon might look at his head. I found

about

about a third part of the left parietal bone covered by a flattiſh tumor, containing a fluid.

From the appearance of this ſwelling, from the date of the accident, the attack, violence, and duration of the ſymptoms, I made no ſcruple to give my opinion, that the blow had been the ſole cauſe of all the child's illneſs; that I ſuſpected the ſkull under the tumor to be bare, if not injured; that I did alſo believe, that matter was forming, or formed, under the ſkull; and, that if the laſt conjecture was true, the only chance the child could have of preſervation, muſt be from the operation of the trephine.

The ſcalp was divided, and the ſkull found as I ſuſpected, that is, perfectly bare, and altered from a natural colour; I would therefore have perforated it immediately; but as the bone was not broken, the parents objected to ſuch operation; and the phyſical gentleman, who had the care of the boy, not having ſeen much buſineſs of this kind, and not rightly comprehending the true nature of the caſe, joined in opinion with the parents, that ſuch operation was not neceſſary. It was therefore not

performed,

performed, and the whole was committed to internal remedies.

The fever increaſed, and the child's ſtrength decreaſed in proportion: he continued delirious for three days more, then ſank into a ſtate of inſenſibility, and died.

Having been contradicted, and (as I thought) ſomewhat improperly overruled, in the management of the patient while alive, I was the more importunate to get leave to examine him when dead.

All that part of the dura mater which had been covered by the left parietal, and part of the temporal bone, was detached from the ſaid bones, and covered with a conſiderable quantity of matter. Under the middle part of the former bone, the dura mater was diſcoloured, and ſloughy; this diſcoloured part I opened with a lancet, and let out near a ſpoonful of matter; which matter lay between the meninges. All the reſt of the contents of the head were unaffected.

When firſt I ſaw this child, all chance of relief from evacuation was over; and his ſymptoms plainly indicated miſchief under the ſkull. Nothing therefore but

per-

perforation could give him any kind of chance.

I do not ſay, that this operation would have ſaved him; I am much inclined to believe that it would not; but ſtill it was the only thing, that could with propriety have been done for him; and therefore it ought to have been done, inſtead of waſting time with the uſe of internal remedies, from which no poſſible good could be expected, or derived.

CASE IV.

Contuſion without Wound.

A Labouring man fell from a ſcaffold, two ſtories high, by which he was for a few minutes ſtunned, and inſenſible, but ſoon recovered. He was let blood; and having bruiſed his right arm, and the ſame ſide of his forehead, he was properly dreſſed, by ſome body in the neighbourhood.

Next day being very well, he returned to his labour, and followed it daily for five more. On the ſixth, finding himſelf a

good

good deal out of order, he came to the hoſpital for advice. He complained, of ſhooting and frequent pain in his head; of giddineſs, and inclination to vomit; and ſaid, that he felt, as if a cord was drawn tight round his brain. On the right ſide of his forehead was a ſmall tumor, neither tenſe, nor painful, but palpably containing a fluid. I perſuaded the man to let me open it. I found a ſmall quantity of a brown fluid, covering the bone, perfectly denuded of its perioſteum; upon which diſcovery, I removed the whole piece by a circular inciſion; fourteen ounces of blood were drawn from his arm; a glyſter was thrown up, and he was confined to his bed, and barley water.

Next morning, (the ſeventh) his pulſe was full, hard, and frequent; he had ſlept very little, and that in a very diſturbed manner. He was, by the phyſician's order, let blood again, and directed to take the ſal abſinthii mixture, with rhubarb ſextis horis. On the eighth day, he was let blood again from one of the jugulars; and being ſtill rather coſtive took a gentle purge. On the ninth, his pulſe was ſtill higher and harder, and his ſkin more hot and dry; twelve

ounces

ounces more of blood were drawn off from one of the temporal arteries. That evening he had a ſhivering; after which he complained that his pains were much increaſed. Next morning, (the tenth) his ſore looked very ill; was pale, ſpongy, and glaſſy, and the ſcalp ſeparated from the ſkull to ſome diſtance beyond the edges of the wound. I ſet on a trephine, and removed a piece of the cranium, under which the dura mater was ſmeared over with matter, and had loſt its bright colour. That night he got no ſleep, and toward morning had another rigor. The eleventh, at noon, he was manifeſtly worſe, in every reſpect; his pain was intenſe, his fever high, and his ſore as ill-conditioned as poſſible. With the largeſt trephine I had, I took away another piece of the cranium, nearer to the temporal bone, and by means of this opening, procured the diſcharge of a conſiderable quantity of matter. This done, finding his pulſe ſtill high, and full, I drew off ten ounces more of blood, and ordered him a glyſter. The loſs of blood produced a ſwooning, which laſted ſome minutes; after which, he ſaid, that he thought his head was rather eaſier. As the evening approached, his pain returned,

wherefore

wherefore ſome leeches were applied to his temples. That night he got a little quiet ſleep, and in the morning of the twelfth day, ſaid that his head was perfectly eaſy: a very large diſcharge of matter had been made through the perforation in the cranium, and I thought that the wound of the ſcalp wore rather a better aſpect. He was kept ſtrictly to a proper low regimen; took at firſt the ſal abſinthii mixture freely; when his pain had left him, the phyſician ordered him the bark; and in a very few days every bad ſymptom and appearance left him.

Would not this caſe, which ended ſo happily, have been attended with the moſt fatal conſequences, if the free perforation of the ſkull had been omitted, or if leſs blood had been drawn off.

CASE

CASE V.

Contuſion with Wound.

A Young fellow of about twenty years, was thrown from an unruly horſe, againſt one of the rails in Smithfield. The blow was great; he lay ſenſeleſs for above an hour, and in that ſtate was brought into St. Bartholomew's hoſpital.

He had a large wound on one ſide of his forehead, the ſkin of which was partly torn quite off, and partly turned down over his eye. The lips of the wound were, by the perſon who ſaw him firſt, brought as near together as they would admit; but ſuch a portion was loſt, as neceſſarily left the bone bare about the breadth of a ſhilling. As ſoon as his wound had been examined, he was let blood and put to bed. The next day, his pulſe being hard and full, he was again let blood, and was ordered to have a glyſter, a lenient purge, and ſome febrifuge medicines. On the third, the wounded ſcalp, and that ſide of the face being much ſwollen, a warm cataplaſm was applied over the dreſſings, and the part was well fomented; and in about five days more, every

thing

thing wore ſo good an aſpect, that the man ſeemed to be getting well apace. On the ninth, he complained of being out of order, ſaid his head ached, and that he had not ſlept the preceding night. He was hot and feveriſh, and his pulſe hard and full. He was therefore let blood again, and ordered to have a glyſter, and to be kept very low. On the tenth, in the night, he had (as he called it) a chillineſs came all over him; after which, his pain was conſiderably increaſed. On the eleventh, his ſore ſeemed to ſpread, diſcharged a thin gleet inſtead of matter; the lint with which it was dreſſed, ſtuck faſt to all parts of it; and its ſurface, from having been florid and granulated, became tawny and ſpongy. That day he had another ſhivering; and on the next, being the twelfth, a conſultation was held on him. He was now very hot and feveriſh; his face much flushed, an eryſipelas beginning to appear on his eye-lids; his ſore very ill-conditioned, and the bare bone ſo much changed from its natural colour, that it looked as if matter might have been ſeen through it. Conſideratis conſiderandis, it was agreed that he had no chance for his life but by perfo-

ration

ration of the bare cranium. The operation was immediately performed, and a quantity of matter found on the dura mater. For ſeveral days the diſcharge was great, and the man continued very ill; but about the eighteenth day the fever left him; he became eaſy, the diſcharge leſſened, his ſore put on a good face, and he got a natural ſleep. From this time nothing ſiniſter happened, and the man got ſoon well.

CASE VI.

Contuſion without Wound.

A Lad about twelve years old, ſtanding by a man who was playing at cricket, received a blow from the bat on his forehead. The boy became ſenſeleſs, and as he was not known to any body preſent, he was brought to the hoſpital. He recovered his ſenſes before he got thither; but the part which received the ſtroke being much ſwollen, he was dreſſed, let blood, and ordered to keep in bed. When I ſaw him next morning he had no complaint, but the ſoreneſs of his forehead, under the ſkin of which there ſeemed to be a good deal of extravaſated,

coagulated blood. His pulſe was full and ſtrong; he was therefore again let blood: and as he had not had a ſtool for two days, a glyſter was thrown up, and a lenient purge given. A diſcutient cerate was kept upon his forehead; and being of a coſtive habit, he was purged once in two or three days; and on the ninth, from that of the accident, was diſcharged from the houſe. On the fourteenth, he returned to it again, complained of laſſitude, giddineſs, and headach. He was put under the care of the phyſician, was let blood, vomited, purged, and took proper medicines; but remained much the ſame for three or four days: that is, he was feveriſh, with a ſkin too hot, a pulſe too quick, and what little ſleep he got was unquiet and ſhort. On the ſeventeenth day he had a ſlight rigor, during and after which his pain in the head was much more intenſe, and the following day all his febrile ſymptoms were much exaſperated; on the nineteenth, he complained of tenderneſs to the touch on his forehead, and great general pain in his head. He was again let blood, and was more ſunk by the diſcharge than I could have ſuppoſed; but no remiſſion of his ſymptoms followed.

His

His ſleep that night was very little, and very unquiet; toward morning he had two diſtinct ſhiverings; and when I ſaw him at noon, on the twentieth, his forehead appeared ſomewhat tumid and puffy. From the continuance and exaſperation of his ſymptoms, and from the new appearance on his forehead, I was almoſt certain there was miſchief on or under the ſkull; I therefore divided the ſcalp, to examine the bone; and found, between it and the pericranium, which had quitted its adheſion for more than the breadth of a crown piece, a ſmall quantity of a thin, diſcoloured fluid.

This (as it appeared to me) put the nature of the caſe out of doubt, and left the boy no chance, but from perforation. I therefore applied the trephine immediately, and gave diſcharge to matter formed between the dura mater and bone. For a week after the operation, the diſcharge was large, and the boy in much hazard; but at the end of that time, the ſuppuration leſſened; the dura mater incarned kindly; and by proper care, and taking freely of the decoct. cortic. peruv. he got well.

CASE VII.

Contuſion without Wound.

A Man in the neighbourhood of St. Giles's had a quarrel with his wife; in which he ſtruck her over the head with a mop-ſtick. The blow was a ſmart one; but as it neither fetched blood, nor brought her to the ground, it only finiſhed the diſpute, and no farther notice was taken of it. The woman followed her buſineſs, which was that of crying greens about the ſtreets, and lived, (to uſe her own words,) ſometimes drunk, ſometimes ſober, for a week. On the eighth day from that of the blow, ſhe found herſelf ſo ill, that ſhe applied to the hoſpital for admiſſion; and was taken in as a phyſician's patient for a fever. The doctor wrote for her; and the day after this, (the tenth from the accident) the ſiſter of the ward, in cutting off the patient's hair, which was full of vermine, diſcovered a ſwelling, which ſhe deſired me to look at: it was flattiſh, about the breadth of the palm of a hand; and lay immediately a-croſs the ſagittal ſuture. The woman had now a

hard,

hard, full pulſe, a hot dry ſkin, a black tongue, a frequent inclination to vomit, great thirſt, intenſe pain in her head, and got no ſleep. From theſe ſymptoms and appearances, and from the account which the woman now firſt gave of the blow, I made no heſitation to ſay, ſuch blow was the cauſe of all her ſymptoms. That night ſhe had a ſevere rigor; and the next day, the eleventh, an eryſipelas had taken poſſeſſion of part of her viſage. I opened the tumor, and finding the bone bare, cleared away the ſcalp largely, and circularly. I then applied a trephine on one ſide of the ſuture and cloſe to it; and found the dura mater altered in its natural colour, and as it were ſmeared over with matter. She paſſed the ſucceeding night very ill, was in great pain, got no ſleep, and had two ſhiverings. When I came to her the next day, her whole viſage was covered with an eryſipelas, and ſo ſwollen, that ſhe could not open her eye-lids. I applied the trephine on the other ſide of the ſuture, and found the ſame appearance, viz. matter on the ſurface of the membrane. She had within the laſt two days been let blood three times; and had conſtantly taken ſuch medicines as the phyſician had ordered

for her, and which were calculated to abate her fever, and keep her body open. Her ſymptoms ſtill continued without abatement; the wound of the ſcalp bore as bad an aſpect as poſſible, ſhe talked very inconſiſtently, got not a wink of ſleep, and called perpetually for drink. As the quantity of bone made bare by the removal of the ſcalp gave room for the farther application of the inſtrument, I made a third perforation near to the firſt, and immediately gave thereby diſcharge to ſo large a quantity of matter, as to ſatisfy me the event muſt be fatal.

The next day the right arm and leg became paralytic, and the day following that, from having been raving, ſhe ſunk into a ſtate of perfect inſenſibility, had a ſhort, laborious reſpiration, a ſmall interrupted, faultering pulſe, and cold extremities; and on the ſixteenth day from that of the accident ſhe died.

Upon opening the head, the dura mater was found covered with matter, under the whole internal ſurface of both the parietal bones; but the firm adheſion of the longitudinal ſinus to the ſagittal ſuture had prevented all communication between the two collections of matter.

CASE VIII.

Contuſion with Wound.

A Lunatic threw himſelf from a window, two ſtories high, and in his fall, ſtruck his head, firſt againſt a ſign-iron, and then againſt a ſlated pent-houſe.

He was taken up ſenſeleſs, with three wounds on his head; one juſt above the right temple, and two on the top of his head: the wounds were but ſmall, nor was the pericranium divided in any of them. He remained ſtupid above twelve hours; but being in that ſpace of time let blood freely twice, he recovered his ſenſes, but ſhewed no ſigns of a right underſtanding. He paſſed two days and nights in the utmoſt diſorder and diſturbance. He was confined in a ſtrait waiſtcoat, and kept two people conſtantly employed in holding him; at laſt, by repeated phlebotomy, and taking a large quantity of opium, he fell aſleep, ſlept near twelve hours, and then awoke perfectly tranquil, and perfectly rational. By the ſixth day from that of the fall, his wounds were

in perfect good order, and seemed to heal without any trouble; the man was in very good health and temper, and perfectly rational and intelligent. He would have been permitted by his friends to have gone out a little way into the country; but lest there should be any latent mischief, I advised him to keep quiet a little longer, and to live with great caution; which advice was followed. On the tenth day from that of the accident, he lost his appetite, looked dull and languid, refused food and company; complained that his head ached, and said, that he had not slept. So little time had passed since he had been disordered in his mind, that, from his aspect and manner, I suspected a return of his lunacy. I let him blood again, directed that he might be kept low, and desired his brother, who was an apothecary, to give him an opiate at going to bed. The next day, the eleventh, he said that his head-ach had again prevented him from sleeping all night; and that he felt as if a cord was bound tight about his brain: his skin was too hot, his pulse was too hard and too frequent; his urine small in quantity, and high coloured; and the aspect of the wounds in the scalp, by no means

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ſo favourable as they had hitherto been: one of them looking more ſpongy and pale than the others, I examined with my probe, and found the ſkull bare for ſome ſpace, under it. With his own and brother's conſent, I removed all the ſcalp covering the bare cranium, and found it to be conſiderably altered from a natural colour. I bled him again, and deſired that he might take freely of the ſalt of wormwood and lemon juice until the next day. That night he had a ſmart rigor; and the next morning finding him worſe, and more diſturbed, I made a perforation of the ſkull. The dura mater under this perforation was dull, and had apparently matter on its ſurface, though ſmall in quantity. He was dreſſed lightly, and, as his pulſe would very well bear it, eight ounces more of blood were drawn off. The following morning, the thirteenth, he had a ſtill more ſevere ſhivering: his pain in his head was greater, his fever higher, and the whole ſore ſo crude, that the lint was with difficulty removed from it. I applied the trephine again, and found the ſame appearance, viz. a dull diſcoloured dura mater, and a ſmall quantity of matter. That evening he had another rigor, and was the following

lowing day manifeſtly worſe. Convinced, from the ſymptoms, of his hazard, and firmly believing that matter was collected, in ſuch manner as not to be diſcharged by the two openings already made, I ventured to make a third, and that a large one; this produced an immediate and large diſcharge of pus. In ſeven or eight hours I ſaw him again, and found him eaſier and more tranquil. He had ſlept nearly an hour, and his pulſe did not feel ſo rapid, nor ſo hard. That evening he got more ſleep, and the following morning anſwered every queſtion aſked, in ſuch manner, as to convince every body that he was certainly better. To ſhorten the relation, I ſhall only add, that the diſcharge continued large for ſeveral days, then gradually decreaſed: all his ſymptoms by degrees alſo diſappeared, and in no great length of time, by proper care, he got very well.

When this patient was attacked with his firſt ſymptoms, I did not ſuſpect the true cauſe. His want of ſleep, his ſeeming anxiety, his taciturnity, and great unwillingneſs to anſwer any queſtion, ſeemed to me, to beſpeak a return of his maniacal diſorder. Upon this ſuppoſition, I gave him the opiate;

ate; hoping, that if I could procure ſleep, he might be better. But when I ſaw the altered appearance of the wound, and found that the pericranium had quitted its adheſion to the ſkull, I was no longer in doubt, that whatever elſe might concur to diſorder him, yet all his complaints were fairly deducible from the effects of his fall. And I apprehend he owed the preſervation of his life to the treatment he underwent, in conſequence of ſuch ſuppoſition.

CASE

CASE IX.

Contuſion with Wounds.

A Watchman, whoſe ſtand was in Whitechapel, got into a ſcuffle with ſome drunken ſailors, and received ſeveral wounds and blows on his head; from ſome of which he loſt ſo much blood, that he was the next day brought into St. Bartholomew's hoſpital in a very weak low ſtate.

Not one of the wounds, which were five in number, had paſſed the pericranium; but his whole head was very much ſwollen and bruiſed. He was in other reſpects very well; that is, he did not complain of ſickneſs, or any other kind of pain than what ſoreneſs the bruiſes neceſſarily occaſioned; and he had the full and perfect uſe of his ſenſes. As he had already ſuſtained great loſs of blood, and was more than ſixty years old, I made uſe of no farther evacuation, but dreſſed his head ſuperficially, and directed that he ſhould be kept in bed. At the end of about a week, the general tumefaction of the head was nearly gone, and all the wounds in a healing ſtate; the man

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tranſgreſſed the rules of the hoſpital by ſtaying out all night, and was diſcharged. On the fifteenth day from that of the accident, he came to me again, complaining of head-ach, giddineſs, ſickneſs, failure of ſtrength, loſs of appetite, and want of ſleep.

All the wounds, except one, were perfectly healed; this was on the upper part of the right parietal bone; it was crude, ſpongy, and the exuberant fleſh of ſuch colour and conſiſtence, as inclined me, (conſidering at the ſame time his general ſymptoms) to ſuſpect miſchief underneath it. I took him into the houſe again, and immediately removed a circular portion of the ſcalp, including the wound, and found both pericranium and ſkull in the ſtate I ſuſpected; that is, the former altered, and detached, and conſequently the latter bare. Neither the age, habit, nor ſtate of the man ſeemed to be capable of bearing free evacuation, nor did I in my own opinion believe that there was time for the experiment. I therefore perforated the middle of the bare part of the bone, and found a ſufficient warrant for having ſo done; that is, a ſmall quantity of matter on the ſurface of the dura mater. His head was dreſſed lightly,

lightly, a little blood was drawn from one of his arms, and a glyſter thrown up to procure a ſtool. The following night he paſſed ill; had a ſlight ſhivering, got little or no ſleep, and complained very much of pain in his head; the bare membrane looked very crude, diſcharged a thin gleet, and preſſed hard againſt the edges of the bone. The next day, his pulſe being conſiderably riſen, he was let blood again: that afternoon he had another rigor, and his pain as well as fever became more intenſe.

On the eighteenth day, finding him in every reſpect worſe, I made another perforation, juſt below the former, and gave thereby a diſcharge to a larger quantity of matter, which the cloſe preſſure of the dura mater againſt the edges of the perforation had hitherto confined. On the twentieth, he was indeed rather eaſier, but his fever was very high, and both the dura mater and ſore in the ſcalp looked very ill; wherefore ſuſpecting more matter, and being ſatisfied the man had no other chance for life, I made a third perforation cloſe by the ſecond. This procured ſo large a diſcharge of pus, that I was very apprehenſive that the extent of the miſchief was too great for the

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assistance of art to prove effectual in; however, I was luckily disappointed; for in a very few days more all his bad symptoms gradually left him, and the man got perfectly well.

From considering all the circumstances of this case, I am satisfied, that had not the cranium been perforated at all, the man must have died, from the collection and confinement of matter: and I am also as much convinced, that the two former perforations would have proved insufficient for the purpose; and that the man owed his preservation to the large removal of bone.

This is a point of practice, which has by no means been sufficiently attended to by practitioners, nor sufficiently inculcated by the writers of our country at least. Many, who see and are convinced of the justness and propriety of it, want authority to vindicate them in proposing or executing it; and some part of the disgrace which has been cast on the operation of the trepan has arisen from this cause. Practitioners have in general been afraid to make more than one opening, and that generally a small one. If the inflammation be of any extent, or the quantity of matter at all considerable, this one small

open-

opening muſt prove inſufficient, either for the relief of the intenſe inflamed membrane, or for the evacuation of the fluid; and the only probable chance which the patient can have muſt be, from the removal of a large portion of bone; and this equally in the caſe of extravaſation of blood, or ſerum, as in that of abſceſs.

CASE X.

Contuſion joined with extravaſation.

A Fireman, who was at work on the top of an houſe, fell in with the roof of it; he was taken out ſenſeleſs, and brought in that ſtate to the hoſpital.

He had on different parts of his body ſeveral wounds and bruiſes, but none of them ſeemed to be of any great conſequence. On his head were four, one of ſome ſize, on the upper part of the frontal bone, near to the coronal ſuture; two on the left parietal; one on the right ſide of his head, juſt above his ear; and a ſmall bruiſe on the upper part of the os occipitis. Of all theſe wounds, the pericranium was divided in

one

one only, viz. that near the coronal ſuture.

His wounds were dreſſed, he was largely bled, a glyſter was thrown up, and a purging mixture was ordered to be given cochleatim, until he ſhould have a diſcharge per anum. The next day he was in the ſame ſtate, perfectly ſenſeleſs, had the apoplectic ſtertor, a full labouring interrupted pulſe, and ſome difficulty of reſpiration. He had four or five large ſtools, wherefore his mixture was diſcontinued, but ſixteen ounces more of blood were drawn from one of the jugular veins; which evacuation was repeated again in the evening of the ſame day, to the quantity of eight more. On the third day, being ſtill perfectly ſtupid, diſcharging both urine and fæces involuntarily, and having ſtill a full labouring pulſe, both the temporal arteries were opened, and fourteen ounces drawn from thence. On the fourth, finding no alteration, and being ſatisfied that the man's ſtate could hardly be made worſe, I determined to perforate the cranium, and accordingly ſet a large trephine on the upper part of the frontal bone, where the pericranium had been divided. The dura mater was found to be thinly

covered with grumous blood, ſome of which I removed, and thereby made way for the diſcharge of more. The next day, (the fifth) finding that what diſcharge had been made, during the night, was bloody, and that the man was in no reſpect altered for the better, I thought I had ſufficient authority for repeating the operation, which I accordingly did, cloſe by and below the former; and as the blow, by which the wound had been afflicted, ſeemed to have been almoſt exactly on the top of his head, I made a third opening in the parietal bone, cloſe to the ſuture. The appearance under all was the ſame as under the firſt, viz. a thin layer of grumous, or rather coagulated blood.

Next day, (the ſixth) toward evening, the man opened his eyes; and on the ſeventh, in the morning, he ſpake. The diſcharge of blood continued for ſeveral days; and at the end of about a week from this time, ceaſed; the dura mater and the wounded ſcalp wearing as good an aſpect as could be wiſhed, and the patient being eaſy, and rational.

On the eighteenth day, he complained of pain all over his head, was ſick, reached to

vomit,

vomit, and ſaid that he was faint and chilly. On the nineteenth his face was fluſhed, his ſkin hot, his pulſe quick, and hard. He was let blood, and ordered to have a glyſter, and to take ſome medicines of the febrifuge kind. A day or two more paſſed in this manner, his fever not violent, but rather increaſing than remitting; his pain, though not acute, yet ſuch as to deprive him of his ſleep; little rigors occuring irregularly, no perſpiration, and an exceſſive languor. At laſt, on the twenty-firſt day, on the upper part of the os occipitis, on the right ſide where there had been a ſmall bruiſe, a tumor aroſe, ſo characterized, as to ſatisfy me, that the cauſe of the late alteration of circumſtances lay underneath it; it did not riſe to any height, and contained a ſmall quantity of ſanies, but covered a portion of bone which the pericranium had quitted. I removed the ſcalp, and would have ſet on a trephine, but the man obſtinately refuſed to ſubmit to it.

On the twenty-fifth day he loſt the uſe of his left leg and arm, and was much convulſed, in thoſe of his right ſide; which paralyſis and ſpaſm continued until the

twenty-ſeventh, and on the twenty-eighth he died.

Upon examining his head, a collection of matter was found under the bare part of the occipital bone; the dura mater under this matter was ſloughy and putrid, and about a deſert ſpoonful of matter lay between the meninges, juſt under the altered part of the dura mater. In the part where the bloody extravaſation had been, every thing was perfectly fair and free from diſeaſe.

In this caſe there ſeems to have been as clear a diſtinction between the bloody extravaſation, with its effects, and the inflammatory ſtate of the dura mater, with its conſequences, as can be deſired. All the firſt ſymptoms were ſuch as were cauſed by mere preſſure of the extravaſated blood; an obliteration of every ſenſible faculty, attended with the principal ſymptoms of an interrupted circulation. Perforation of the ſkull, where this extravaſation had been made, did, by giving diſcharge to the blood, happily remove theſe, and the man was getting well apace, until the ills ariſing from another cauſe, viz. the inflammatory ſeceſſion of the dura mater, in conſequence of contuſion, and that in another place, began

gan to appear; they indeed made their attack rather late, nor did they riſe ſo high as they moſt frequently do; but then it muſt be conſidered what diſcipline the poor man had undergone, and what evacuation had been made. Notwithſtanding which, they bore their true, genuine, febrile, inflammatory character, and produced their moſt frequent event. What perforation of the os occipitale might have done, I cannot ſay; I fear but little, as the matter was not only upon, but underneath the dura mater, and that too diſeaſed.

CASE XI.

Contuſion with Wound.

A Drayman, drunk, and ſleeping, fell from his dray, and his head was ſo ſqueezed between the wheel and a poſt, that a conſiderable portion of the ſcalp, together with the pericranium, was forced off from each parietal bone.

He was brought to the hoſpital ſenſeleſs; he was largely let blood, and the ſeparated ſcalp being ſo bruiſed and mangled as to afford no probability of re-union, it was removed, and the bone dreſſed with dry lint. The next day the man was ſo well, and ſo perfectly maſter of what ſenſe he had, that I was inclined to believe, that a great deal of the laſt night's appearance was owing principally to liquor.

In ten days time the edges of the torn ſcalp were digeſted, and bore all the appearance of ſores in a healthy man. One of the parietal bones ſeemed diſpoſed to granulate without any exfoliation, the other looked as if it would throw off a ſcale.

On the thirteenth day he was ſo well, that having a large family to work for, he deſired to be diſcharged from the hoſpital, and to be made an out-patient; but his ſores were ſtill ſo large, and I had ſo often been deceived by the fallacious appearance of ſuch caſes, that I perſuaded him to ſtay another week.

On the ſixteenth day he complained much of head-ach, and ſaid, that he was ſick and chilly; on the ſeventeenth, the florid, granulated appearance, and laudable matter of the ſores, were exchanged for a tawny, glaſſy ſurface, and a plentiful, thin gleet. I bled him freely, and bid him keep in bed. On the ſame day toward evening, he had a ſhivering, and the day following two more; that parietal bone (the left) which had hitherto looked as if it would be covered by a granulation, without exfoliating, now wore ſo diſeaſed an aſpect, that I fain would have ſet a trephine on it immediately, but the man would not permit me. Every other means were uſed, but to no purpoſe. The ſore on the right ſide of the head continued to look well, but the ſcalp quitted its adheſion to almoſt the whole left parietal

bone, which bone looked very unlike to an healthy one.

On the twenty-third day, from that of the accident, he died, having been paralytic in his right leg and arm from the twenty-firſt.

The appearance of the two ſores, as well as of the two bones, were ſo different, that I had curioſity to ſee the ſtate of the parts underneath each. On the right ſide the dura mater was in a natural, ſound, adherent ſtate. On the left, it was ſeparated from almoſt the whole bone, and covered plentifully by matter, and was, for about the breadth of a half crown, ſloughy; under the ſlough the pia mater was diſeaſed alſo, and matter was alſo formed on the ſurface of the brain.

The following caſe was brought into St. Bartholomew's hoſpital, while I was confined to my houſe by ſickneſs. The account therefore of the patient, while living, is as taken by Mr. Earle, my apprentice; and that of the appearance after death, is in the words of the late ingenious Mr. Partridge, who aſſiſted Mr. Earle in the examination of the body.

CASE

CASE XII.

ON the tenth of February, 1765, John Biggs, a lad about thirteen years old, was driving a horſe round in a grinding mill, the horſe not being uſed to the work, ran round very faſt; the boy fell and received ſuch a blow from ſome part of the frame in which the horſe worked, that he lay, deprived of ſenſe, for ſome time, that is, until ſomebody came in to enquire why the mill went ſo rapid. He had a ſmall wound on the right ſide of his head, and no other apparent mark of injury. In a few hours, by the aſſiſtance of phlebotomy, he ſeemed to be very well again. His wound was dreſſed by the family apothecary for a week, during which time, he did not ſeem to have any other complaint, except now and then having a ſlight head-ach. The wound, not healing kindly, the boy being a country boy, hired only for the purpoſe of driving the mill-horſe, and the people with whom he lived being tired of keeping him unemployed, he was brought to the hoſpital. The wound was not large, and although he did not ſeem to have any other

other complaint, was nearly three weeks in healing.

On the eighth of March, he was ſeized with a fever, beginning with a kind of cold fit. On the tenth, he was much diſordered, complained of acute pain in his head, and his wound, which had been healed, broke out again; the pericranium ſeparating from the bone on the twelfth, he became ſenſeleſs to all outward objects, was convulſed in all his limbs, and jaw-locked. On this day Mr. Crane trepanned him, on the upper, fore and right ſide of the frontal bone. On the ſurface of the dura mater was found a conſiderable quantity of good matter; on the next morning he died.

The dura mater was detached from the cranium for about an inch all round the perforation of the bone; what matter had been formed on its ſurface had been diſcharged by the operation, and little or none lodged; the pia mater and brain ſound in this part. At about two inches diſtance from the original wound, higher up, and nearer both to the coronal and ſagittal ſutures, was a ſmall tumor about the ſize of a ſplit garden bean; within this was a very little diſcoloured matter, and under it the

bone

bone was bare. The dura mater corresponding with this tumor was detached, black, and sloughy, and a considerable quantity of matter lay under this sloughy part, communicating with an abscess, formed between the two hemispheres of the brain, on the right side of the falciform process.

SECT.

SECT. III.

Separation, or deſtruction, of both tables of the ſkull from Contuſion.

THE ſeparation of a portion of the cranium, conſiſting of both tables, or of the whole thickneſs, happens not unfrequently, in old, or neglected venereal diſorders. The diſeaſe, which in theſe caſes has its ſeat in the diploe, often ſpoils the whole ſubſtance of the bone, and produces a ſeparation, or exfoliation of its whole thickneſs: the dura mater being always found, in ſuch caſe, to be covered only by an incarnation generated from its ſurface.

This kind of caries is ſometimes of large extent, in one piece, but more frequently it is of ſmaller ſize,* and affects different parts of the ſame ſkull. The ſeparated piece is generally quite carious, and appears as if it had been worm-eaten, (what the French call vermoulue). The ſurface of the bone ſo diſeaſed, is ſeldom much elevated, though generally ſomewhat; neither has

* I have ſeen in one caſe, nearly the whole os frontale caſt off; and in another, the whole left parietal bone.

has it often the circumſcribed form and appearance of a true node, as it is called; though now and then it has.

The ſcalp, which covers a bone in this ſtate, is moſt frequently diſeaſed alſo; ſometimes with one, large, ill-conditioned ſore; but more often with a number of crude, foul, painful, ſerpiginous ulcers; through moſt of which a probe will diſcover a rough, bare bone; and from which is conſtantly diſcharged, a greaſy, ſtinking ſanies. This complaint is generally accompanied by a nocturnal head-ach, pocky ſpots, and pains about the breaſt and ſhoulders; and is almoſt always preceded by the former: though very frequently that ſymptom ceaſes, either during the mercurial courſes, inſtituted for that purpoſe; or when the pericranium covering the diſeaſed part, becomes foul and ſloughy.

The proportion of extent of ſurface, which one table of theſe diſeaſed parts of the cranium bears to the diſeaſed part of the other table, is very uncertain, and often very unequal. Sometimes the alteration of the outer table is much more extenſive than that of the inner; in which caſe, when the ſeparation is made, the detached piece comes

away

away very eaſily, and the uncovered part of the dura mater is ſmall, compared to the ſize of the external ſore; but ſometimes, on the contrary, the diſeaſe occupies a more conſiderable extent of the inner table than of the outer, and thereby renders the caſe more difficult and the cure more tedious.

A mercurial courſe, begun, even before the ſcalp covering the diſeaſed parts ſhall have been ulcerated, though it be often ſufficient, fully and perfectly to eradicate the lues from the habit, will neither prevent, nor cure, this local malady; which will therefore often remain, after ſuch cauſe of it has been really and totally removed: the bone is thoroughly ſpoiled, (at leaſt in the parts affected), and although the diſeaſe, conſidered abſtractedly, be cured, yet the texture of theſe harder parts neceſſarily requires more time to caſt off what is unſound, and to put on a healthy appearance, than the ſofter do; the local diſtemper will remain a long time after. An inattention to, or a miſunderſtanding of this circumſtance has been the cauſe, why many people have been harraſſed, and even deſtroyed with unneceſſary mereurial proceſſes, when the complaint has been truly local, which it frequently

quently is after proper, previous mercurial treatment. Such medicines will be found to be ſo far from haſtening the removal, that by ſpoiling the conſtitution, relaxing the ſolids, impoveriſhing and diſſolving the fluids, and weakening the vis vitæ, they prevent nature from executing her own purpoſe, and really protract and retard that effect which they are uſed (though injudiciouſly) with deſign to expedite. Mercury is undoubtedly a ſpecific for the pox, but it is alſo a poiſon. It will cure that and ſome other diſeaſes; but its effects on the human frame are neither light, nor ſuperficial. It becomes beneficial or prejudicial, according to the manner in which it is applied; and when it ceaſes to do good, it will moſt certainly do harm. This, though a very flagrant inſtance of it, is not the only one which might be produced: the ſame obſervation might be made, on the maladies proceeding from a diſeaſed proſtate, and urethra, producing indurations, and fiſtulæ in perineo; in which the perſiſtance in the uſe of mercurials, after the producing lues has been cured, has coſt many a man his life, by aggravating, and continuing that ſymptomatic hectic fever, (the neceſſary conſequence of pain and irritation)

irritation) which it ſhould be the whole buſineſs of art to calm and attemperate. In all theſe caſes a ſtrong decoction of ſarſaparilla, with milk, for the common drink, a ſoft, nutritive diet, a clear air, and the free uſe of the Peruvian bark, will be found to be more conducive to the patient's recovery, than any continued uſe of mercury. By the former he will be reſtored and ſtrengthened, by the latter he will be irritated, waſted and deſtroyed.

The ſame kind of exfoliation or ſeparation of both tables of the cranium, is ſometimes the conſequence of mere external violence*.

The

* Morgagni deduces this from miſchief done to the veſſels of the diploe. "Antequam de Calvariæ ictibus "verba facere deſinamus, illud non eſt prætereundum, "utraque ejus tabula prorſus illæſa, illæſiſque ſubjectarum meningum vaſis, accidere aliquando ab ictu valido obtuſi corporis, ut vaſcula, quæ inter tabulas medullæ ſubſerviunt, rumpantur, & ſanguinem fundant; "qui procedente tempore corruptus, eoque acrior factus, quod ſuccus medulloſus admiſceatur, qui tum "mora et calore, in peſſimam degeneret rancedinem, "interiorem tabulam carie afficiat; hominique, jam "ictu oblito, & nihil ejuſmodi timenti, intro defluens, "meninges vitiet, necemque afferat."

De Sedibus & Cauſis, &c.

The four following examples, which have fallen within my own knowledge, I ſhall relate without any comment.

CASE XIII.

A Gentleman's coachman was thrown from his box, on the road between London and Richmond, and received a wound in his forehead, which divided the pericranium, and denuded the bone about an inch above the ſinus. The man received no other harm in the fall; the lips of the wound were brought together by ſuture, and he drove home.

The next day his maſter, who was a governor of St. Bartholomew's, and a timorous man, ſent the patient into that houſe. As he ſeemed perfectly well, and the wound looked as if it would unite without any trouble, I dreſſed him only with a ſuperficial pledgit. This did not ſucceed, and the edges, inſtead of uniting, became ſpongy. I therefore ordered him to be dreſſed with a little dry lint, thinking that the bare bone would ſoon throw off a ſmall ſcale, and finiſh the matter. At the end of three weeks every thing was exactly in the ſame

ſtate; the bone bare, and not likely to exfoliate, and the edges ſpongy. Being in perfect health, the man was tired of the confinement of the hoſpital, and was permitted to go home, taking dreſſings with him.

At the end of two months from the date of the fall, he returned to the hoſpital again, and deſired me to look at his ſore; which was not only not healed, but diſcharged much too large a quantity of matter. The opening was about the ſize of a ſilver three-pence, round, ſoft, and ſpongy. Upon feeling with a probe, I thought that the bone receded too much for a mere looſe exfoliation, and as the bone receded, the diſcharge of matter increaſed. Upon repeated trials, I was thoroughly ſatisfied, that both theſe circumſtances were true, and alſo that the looſe piece was much too large to be extracted from the preſent opening.

I conſidered, that the removal of a circular piece of ſkin would leave a ſcar, which would not only be a great deformity, but a deformity which would be liable to miſconſtructions; and as there were no bad ſymptoms to be obviated, nor any

thing

thing to be done, but merely to remove the looſe portion of bone, I made a longitudinal inciſion, ſufficient for its extraction, and laying hold of it with a pair of forceps, brought it away. It was the whole thickneſs of the cranium, in every part firm, hard, and perfectly white; and it left the dura mater covered by a florid healthy incarnation. I laid the divided ſcalp down upon the membrane, without any intervening dreſſing, and the ſore healed in a few days.

CASE XIV.

AN elderly woman riding in a hackney landau, by a ſudden jolt ſtruck her head with great violence againſt an iron hook, at the top of it, put there to hold the two parts of the roof together. The blow gave her exquiſite pain for the inſtant, but that ſoon ceaſed; and as it cauſed neither wound nor tumefaction, ſhe took no farther notice of it. At the end of near two months, ſhe was ſeized with a violent pain in her head; ſo violent, that for ſeveral nights ſhe was obliged to have recourſe to

laudanum, in order to obtain a little broken reſt.

In about a week her pain went off, and a tumor aroſe, juſt where ſhe had been ſtricken; that is, juſt in the middle of the ſagittal ſuture.

Mr. Brown, of Little Britain, had the care of her; with him I ſaw her; we opened the tumour, and diſcharged a conſiderable quantity of diſcoloured and very offenſive matter. I paſſed my finger into the opening, and to my great aſtoniſhment found it touched the dura mater. We removed a circular piece of the ſcalp, and found the two oſſa parietalia bare, and carious for a conſiderable extent, on each ſide of the ſuture; and in the middle of this carious piece, juſt in the tract of the ſuture, a hole large enough to admit eaſily any man's finger, without touching the edges of the bone.

No exfoliation was found in the matter, or on the membrane; the dura mater lay at a conſiderable diſtance from the ſkull, in that part; the diſcharge from within was large and very offenſive; and about three weeks, from the time of opening, ſhe died ſuddenly in a kind of fit.

CASE

CASE XV.

IN the middle of September 1763, a woman about ſixty years old fell down ſtairs backwards; ſhe was ſtunned by the blow, which her head received from one of the ſteps, and lay ſenſeleſs ſome time.

There was neither wound nor conſiderable bruiſe; ſhe was let blood, and kept quiet for ſome few days; at the end of which, finding no inconvenience either general or particular, ſhe ceaſed to regard it.

On the eighteenth of December, ſhe was taken into the hoſpital, for a ſwelling on the right ſide of her head, nearly of the ſize of a ſplit Sevile orange. This tumor ſhe ſaid, had been preceded by a ſevere head-ach without fever; but as ſhe did not then believe that her fall had any ſhare in the production of her preſent complaint, ſhe ſaid nothing about it.

Her head being ſhaved, the tumor appeared full of a fluid. I divided the ſcalp, and let out a quantity of greaſy offenſive matter. Upon farther examination, the bone was found to be bare, and carious. I removed ſuch a portion of ſcalp, as brought

the whole into view. The natural texture of the bone was deſtroyed, and in it were ſeveral holes, through which a probe might eaſily be paſſed, and from which matter was diſcharged in ſuch manner, and with ſuch motion, as plainly proved, that it came from within the cavity of the ſkull.

She remained in the hoſpital until the middle of March; during which time no alteration appeared in any part of the bare bone.

The affairs of her family now required her to be at home. She was in perfect good health; was diſcharged from the hoſpital; and as ſhe lived very near to me, one of my young gentlemen undertook to take care of her. On the twenty-eighth of March 1764, a ſmall part of the bare bone came away, and left the dura mater covered by an healthy incarnation; and on the twelfth of April following, the whole remainder, being about a third part of the parietal bone, did the ſame. From firſt to laſt ſhe had no kind of uneaſineſs, and the ſore healed without any trouble.

CASE XVI.

IN that ever memorable defence, made by Capt. Gilchriſt, on board (as I think) the Southampton man of war, againſt a moſt ſhameful ſuperiority of French force; a ſailor received a ſevere blow on his head by a large ſplinter; a ſmall wound and a conſiderable bruiſe were the immediate conſequence; but they were ſo ſoon well, that the man did duty in a few days. At about ſeven weeks diſtance from the time of the accident, he began to complain of great pain in his head; which pain in a few days rendered him ſo incapable, that he was put into the hoſpital at Goſport. He remained there about three weeks, frequently but not conſtantly in pain; and during that time had three or four fits, like epileptic ones.

He was now ſent to St. Bartholomew's hoſpital, and put under the care of Dr. Pitcairn, by whoſe order he was bled, purged, and took ſeveral medicines. The man having one day mentioned the circumſtance of the blow, the doctor deſired that I might examine him.

There was not the leaſt degree of ſwelling or inflammation, no mark or veſtige of a ſcar, nor any elevation of the ſcalp, or fluctuation of fluid under it. While I was examining his head, he had a ſlight attack of ſpaſm; but on my deſiſting, he became eaſy and tranquil.

The circumſtance of this attack, while I was preſſing upon the part did not at that inſtant ſtrike me, as worthy notice, but upon reflexion it appeared much ſo. The next day I made the ſame experiment, with the ſame effect; that is, upon hard preſſure he became convulſed, which convulſion ceaſed upon removing the fingers, but was followed by a rigor. On the following day I ventured to repeat the experiment; but the man was ſo immediately and ſo terribly convulſed, that I determined never to try it again.

I informed his phyſician of all that had paſſed, and we agreed, that conſidering the inefficacy of all that had hitherto been done, and what had lately happened, the moſt probable method of attempting his relief would be, by denuding and perhaps perforating the cranium, in the place where the preſſure produced ſo ſtrange an effect.

The

The next day I removed a circular piece of the ſcalp, and found the pericranium not of a healthy or ſound colour, nor adherent to the bone; which bone was carious, and had ſeveral ſmall holes in it, through which a ſanies roſe and fell, according to the motion of the blood in the brain. I applied a large trephine, without any regard to the ſuture, and removed a piece of ſkull. During the time of the operation, the poor man ſuffered greatly from ſpaſm; but that over, he became eaſy and quiet.

The dura mater was detached from the ſkull, and had matter on its ſurface; which matter was extremely offenſive. The enſuing night he paſſed ill; and the next day had ſuch a rigor, that I verily thought it was the laſt trouble the man could have. The day after this I found him vaſtly better; the diſcharge from his head had been large, but he had not ſuffered any return either of ſpaſm or rigor, and his principal complaint was extreme lowneſs.

The phyſician preſcribed for him; his medicines agreed well with him, and every thing for ſeveral days wore a favourable aſpect. On a ſudden, he was ſeized with all the

the ſymptoms of a peripneumony, and, on the third day from that ſeizure, died. No apparent cauſe of miſchief was found either within or on the outſide of the head, the dura mater was well incarned, and no lodgment of matter.

SECT.

SECT. IV.

Fiſſures, and Fractures of the Cranium, without Depreſſion.

FRactures of the cranium were, by the ancient writers, divided into many different ſorts, each of which was diſtinguiſhed by an appellation of Greek etymology, borrowed either from the figure of fracture, or the diſpoſition of the broken pieces. Theſe are to be found in moſt of the old books: but as they merely load the memory, without informing the underſtanding, or aſſiſting the practitioner, modern authors have generally laid them aſide.

This kind of injury is diviſible into two general heads, viz. thoſe in which the broken parts keep their proper level, or equality of ſurface, with the reſt of the ſkull; and thoſe in which they do not: or, in other words, fractures without depreſſion, and fractures with.

Theſe two diſtinctions are all which are really neceſſary to be made, and will be found to comprehend every violent diviſion

of

of the parts of the ſkull, (not made by a cutting-inſtrument) from the fineſt capillary fiſſure, up to the moſt complicated fracture: for fiſſures and fractures, differing from each other only in the width of the breach, or in the diſtance of the ſeparated parts; and the diſpoſition of broken pieces, in large fractures, being ſubject to an almoſt infinite variety; diſtinctions and appellations drawn and made from theſe circumſtances, might be multiplied to even three times the old number, without imparting the ſmalleſt degree of uſeful knowledge to the man, who ſhould be at the pains to get them by heart.

What are the ſymptoms of a fractured cranium? is often aſked; and there is hardly any one who does not, from the authority of writers, both antient, and modern, anſwer, vomiting, giddineſs, loſs of ſenſe, ſpeech, and voluntary motion; bleeding at the ears, noſe, and mouth, &c. This is the doctrine of Celſus, which has been moſt invariably copied by almoſt all ſucceeding authors, and implicitly believed by almoſt all readers *.

The

* "Igitur ubi percuſſa eſt calvaria, protinus requiren-
" dum eſt, num bilem is homo vomuerit, num oculi
" ejus

The ſymptoms juſt mentioned do indeed very frequently accompany a broken ſkull; but they are not produced by the breach made in the bone; nor do they indicate ſuch breach to have been made. They proceed from an affection of the brain, or from injury done to ſome of the parts within the cranium, independant of any ill which the bones compoſing it may have ſuſtained. They are occaſioned by violence offered to the contents of the head in general; are quite independant of the mere breach made in the bone; and, either do, or do not accompany fracture, as ſuch fracture may happen to be or not to be complicated with ſuch other ills.

They are frequently produced by extravaſations of blood, or ſerum, upon, or between the membranes of the brain; or by ſhocks, or concuſſions of its ſubſtance, in caſes where the ſkull is perfectly intire and unhurt. On the other hand, the bones of the ſkull are ſometimes cracked, broken, nay even depreſſed; and the patient ſuffers none

" ejus obcæcati ſint; num per nares, aureſve ſanguis ei " effluxerit; num conciderit; num ſine ſenſu quaſi dor- " miens jacuerit? &c. hæc enim *non niſi oſſe fracto eve-* " *niunt*."

none of theſe ſymptoms *. In ſhort, as the breach made in the bone is not, nor can be, the cauſe of ſuch complaints, they ought not to be attributed to it; and that for reaſons, which are by no means merely ſpeculative. For the practitioner, who ſuppoſes that ſuch ſymptoms do neceſſarily, and certainly imply, that the cranium is fractured, muſt regulate his conduct by ſuch ſuppoſition; and remove the ſcalp, very often without either neceſſity, or benefit; that is, without diſcovering what he looks for: and, on the other hand, if he does find the ſkull to be broken; believing all theſe complaints to be cauſed by, and deducible from, the fracture, he will moſt probably pay his whole attention to that ſuppoſed

* "Si læſus inſtar dormientis ſenſus expers deprehenda-
" tur; ſi oculi ejus obcæcati fuerint; ſi obmutuerit; ſi
" bilem vomuerit; ſi animalis inſtar malleo icti concide-
" rit; hæc omnia maximam & ſubitaneam ſignificant ce-
" rebri commotionem, perturbationem, ac concuſſionem,
" *quæ non rara integro* manente, nec ulla *ex parte rupto*
" *cranio*, mortem percuſſo adferunt." PET. PAAW.

" Dans les playes de tête, les accidens que les auteurs
" anciens ont appellés primitifs parce qu'ils arrivent dans
" l'inſtant meme de la bleſſure, ne ſont nullement des ac-
" cidens, ni des ſignes, de la fracture ſubſiſtant, mais des
" accidens, & des ſignes, de la commotion de cerveau."
LE DRAN.

ſuppoſed cauſe, and may think, that when he has done what the rules of his art preſcribe for ſuch caſe, he has done all that is in his power. An opinion not infrequently embraced; and which has been the deſtruction of many a patient: for, as on the one hand, the loſs of ſenſe, ſpeech, and voluntary motion, as well as the hæmorrhage from the noſe, ears, &c. are ſometimes totally removed by, or at leaſt diſappear during the uſe of free and frequent evacuation, without any operation on the ſcalp or ſkull; ſo on the other, as theſe ſymptoms and appearances are not produced by the ſolution of continuity of the bone, they cannot be remedied by ſuch chirurgic treatment, as the mere fracture may require.

If any one doubts the truth of this doctrine, I would deſire him to conſider the nature, as well as moſt generally ſucceſsful method, of treating theſe ſymptoms; and at the ſame time, to reflect ſeriouſly, on the operation of the trepan, as practiſed in ſimple, undepreſſed fractures of the ſkull.

The ſickneſs, giddineſs, vomiting, and loſs of ſenſe and motion, can only be the conſe-

conſequence of an affection of the brain, as the common ſenſorium. They may be produced by its having been violently ſhaken; by a derangement of its medullary ſtructure, or by unnatural preſſure made by a fluid extravaſated on its ſurface, or within its ventricles; but never can be cauſed by the mere diviſion of the bone, (conſidered abſtractedly) which diviſion, in a ſimple fracture, can neither preſs on nor derange the ſtructure of the parts within the cranium.

If the ſolution of continuity in the bone be either produced by ſuch a degree of violence, as hath cauſed a conſiderable diſturbance in the medullary parts of the brain, or has diſturbed any of the functions of the nerves going off from it; or has occaſioned a breach of any veſſel, or veſſels, whether ſanguine or lymphatic; and that hath been followed by an extravaſation, or lodgement of fluid, the ſymptoms neceſſarily conſequent, upon ſuch derangement, or ſuch preſſure, will follow; but they do not follow, becauſe the bone is broken; their cauſes are ſuperadded to the fracture; and altho' produced by the ſame external violence, are

yet

yet perfectly and abſolutely independant of it; ſo much ſo, that, as I have already obſerved, they are frequently found where no fracture is.

The operation of the trepan is frequently performed in the caſe of ſimple fractures, and that very judiciouſly and properly; but it is not performed, becauſe the bone is broken, or cracked: a mere fracture, or fiſſure of the ſkull, can never require perforation, or that the dura mater under it be laid bare; the reaſon for doing this ſprings from other cauſes than the fracture, and thoſe really independant on it. They ſpring from the nature of the miſchief which the parts within the cranium have ſuſtained, and not from the accidental diviſion of the bone. From theſe ariſe the threatening ſymptoms; from theſe all the hazard; and from theſe, the neceſſity, and vindication, of performing the operation of the trepan.

If a ſimple fracture of the cranium was unattended in preſent with any of the before-mentioned ſymptoms, and there was no reaſon for apprehending any other evil in future; that is, if the ſolution of continuity in the bone was the whole diſeaſe, it could not poſſibly indicate any other cu-

rative intention, but the general one, in all fractures, viz. union of the divided parts. But how can ſuch union be promoted or aſſiſted by perforation? it moſt certainly cannot; and yet perforation is abſolutely neceſſary in ſeven caſes out of ten, of ſimple undepreſſed fractures of the ſkull. Let us for a moment enquire why it is ſo. The reaſons for trepanning in theſe caſes are, firſt, the immediate relief of preſent ſymptoms ariſing from preſſure of extravaſated fluid; or ſecond, the diſcharge of matter formed between the ſkull and dura mater, in conſequence of inflammation; or third, the prevention of ſuch miſchief as experience has ſhewn may, moſt probably, be expected from ſuch kind of violence offered to the laſt-mentioned membrane. Theſe are the only reaſons that can be given for perforating the ſkull, in the caſe of an undepreſſed fracture; and very good, and very juſtifiable reaſons they are; but not drawn from the fracture.

In the firſt caſe, (that of an extravaſated fluid within the cranium), the relief from perforation is not only ſometimes immediate, but frequently is not attainable by any other means. This is a ſufficient proof

not

not only of its utility, but of its neceſſity.

In the ſecond, (of formation of matter between the ſkull and dura mater), it is the unicum remedium: there is no natural outlet, by which ſuch matter can eſcape; and the only chance of life is, from the operation.

In the third, that of mere fracture without depreſſion of bone, or the appearance of ſuch ſymptoms as indicate commotion, extravaſation, or inflammation, it is uſed as a preventative, and therefore is a matter of choice, more than *immediate* neceſſity.

Many practitioners, both antient and modern, have therefore diſuſed and condemned it; and have, in caſes where there have been no immediate bad ſymptoms, adviſed us to leave the fracture to nature, and not to perform the operation as a preventative, but to wait until its neceſſity may be indicated by ſuch ſymptoms, as may both require and vindicate it. This is a point of the utmoſt conſequence in practice; and ought to be very maturely conſidered.

They who object to the early uſe of the trephine ſpeak of it as being frequently unneceſſary, and as rendering the patient

liable to ſeveral inconveniencies, which may ariſe from uncovering the dura mater, before there is any good, or at leaſt any apparent reaſon for ſo doing. And in ſupport of this their opinion, they alledge many inſtances of ſimple fracture, which have been long undiſcovered, without being attended with any bad ſymptoms; and of others, which, though known and attended to from the firſt, have done very well, without ſuch operation.

They who adviſe the immediate uſe of the inſtrument, do it upon a preſumption, that, in conſiderable violence received by the head, ſuch miſchief is done to the dura mater, and the veſſels by which it is connected to the cranium, that inflammation of the ſaid membrane muſt follow; which inflammation generally produces a collection of matter, and a ſymptomatic fever, which moſt frequently baffles all our art, and ends in the deſtruction of the patient.

What the former aſſert is undoubtedly *ſometimes* true. There have been ſeveral inſtances of undepreſſed fractures of the ſkull, which either from having been undiſcovered at firſt, or neglected, or having been under the care of a practitioner who

has

has diſliked the operation, have done very well without it. This is certainly true, but is not ſufficient to found a general rule of practice upon: in matters of this ſort, a few inſtances are by no means ſufficient to eſtabliſh a precedent: what has been, or may accidentally prove beneficial to a few, may be pernicious to the multitude: that which is found to be moſt frequently uſeful, is what we ought to abide by; reſerving to ourſelves a liberty of deviating from ſuch general rule in particular caſes.

This is one of thoſe perplexing circumſtances, which all writers lament, and all practitioners feel; but which, inſtead of merely complaining of, we ſhould endeavour, as much as in us lies, to correct.

In order to obtain what information we can on this ſubject, we ſhould conſider, firſt, what the miſchiefs are, which may, moſt probably be expected to follow, or which moſt frequently do follow, when perforation has been too long deferred, or totally neglected; ſecondly, what prejudice or inconvenience does really ariſe from, or is thought to be cauſed by the operation itſelf, conſidered abſtractedly; and thirdly, what proportion the number of thoſe who have

done well without it, bears to that of thoſe, who may truly be ſaid to have been loſt for want of it; or of thoſe, to whom it might have afforded ſome chance of relief.

With regard to the firſt, I have already obſerved in the caſe of ſimple undepreſſed fractures, whenever the trephine is applied, it muſt be with deſign either to relieve, or to prevent ills ariſing from other miſchief than the mere breach in the bone; which breach, conſidered ſimply, and abſtractedly, can neither cauſe ſuch ills, nor be relieved by ſuch operation. One, and that the moſt frequent of theſe miſchiefs, is the inflammation, detachment, and ſuppuration of the dura mater, and conſequently the collection of matter between it and the ſkull; a caſe of all others, attending wounds of the head, the moſt preſſing, the moſt hazardous, and the leaſt within our power to relieve. On this ſubject, I have expreſſed my ſentiments ſo much at large, under the preceding article *contuſion*, that it is needleſs to repeat them here. I ſhall therefore take the liberty of referring the reader back to that, and only remind him of a circumſtance well worth his attending to, viz. that there are no immediate, or early marks or ſymptoms,

toms, whereby he can certainly know, whether ſuch kind of miſchief is done or not; and that when ſuch complaints come on, as indicate that ſuch miſchief has been received, although the operation is all that is in our power to do, yet it is very frequently unſucceſsful *. Indeed the only probable method

* The ſtate of the dura mater, under ſimple fractures and fiſſures of the cranium, has been very nicely obſerved, and very juſtly deſcribed, by ſome of the beſt writers of antiquity.

" Si ad cerebri membranam uſque pervenerit fractura, " non rademus, ſed agnoſcere conabimur utrum mem- " brana ab oſſe receſſerit, an affixa permaneat. Si enim " ipſa manet, inflammatio nulla infeſtat vulnus, & pus " coctum apparet. Si ceſſerit membrana, augentur do- " lores, et febris ſimiliter; os alium ſumit colorem; pus " tenue, & crudum effertur; & ſi medicus negligenter " rem tractat, nec *perforatione* utitur, hoc graviora " ſymptomata aboriuntur; nempe bilis vomitus, con- " vulſio, mentis delirium, & febris acuta."

PAULUS ÆGINETA.

" Dico debet dari ſignum fracturæ, a qua removeatur " panniculus groſſus. In primo debes ſcire diſpoſitionem " ſyphae; utrum eſt adherens, an non; videlicet, ſi ad- " hæſerit oſſi non fiet in vulnus apoſtema calidum; & " licet accidit, modicum erit; ærugo manebit de eo " modica; & putredo erit digeſta. Sed ſi fuerit remotus, " vehementiores erunt dolores, & febres, mutabitur color " oſſis, & corrumpetur, & manebit de eo putredo tenuis."

RHAZES.

method of preventing this evil ſeems to be, the removal of ſuch a part of the ſkull, as by being broken appears plainly to have been the part where the violence was inflicted; and which, if the dura mater becomes inflamed, and quitting its connexion ſuppurates, will, in all probability, cover and confine a collection of matter, for which nature has provided no outlet. This I take to be, not only the beſt, but the only good reaſon, for the *early* uſe of the trephine in ſimple undepreſſed fractures of the ſkull: and I muſt add, that it appears to me to be fully ſufficient to vindicate and authoriſe it. That it frequently fails of ſucceſs, is beyond all doubt; the extent and degree of the miſchief being too great for it to relieve; but that it has preſerved many a life, which muſt have been loſt without it, I am as well ſatisfied of, as I am of any truth, which repeated experience may have taught me.

In

Si rima ſit in ſuperficie, cerebri membrana non abſcedente, eadem adhibeatur, quæ ad os nudatum demonſtrata eſt: cerebri vero membrana abſcedente & humore ibi collecto, poſt primos curationis dies ad terebram properandum eſt, &c.

ORIBASIUS.

In matters of this ſort, poſitive proof and conviction are not in our power; all that we can do is, by making a compariſon of the conduct and event of a number of ſimilar caſes, to come as near to truth as we can, and to get probability on our ſide.

The ſecond conſideration which I propoſed to be made was, what miſchief, or inconvenience may moſt reaſonably be ſuppoſed to follow, or to proceed from the mere operation conſidered abſtractedly. They who are averſe to the uſe of it, as a preventative, alledge that it occaſions a great loſs of time; that it is frequently quite unneceſſary; and that the admiſſion of air to the dura mater, as well as the laying of it bare, is neceſſarily prejudicial.

The former of theſe is undoubtedly true; a perſon whoſe ſkull has been perforated, cannot poſſibly be well (that is cured) in ſo ſhort a ſpace of time, as one who has not undergone ſuch operation; ſuppoſing ſuch perſon to have ſuſtained no other injury than the mere fracture: and if the majority of the people, whoſe ſkulls are broken, were ſo lucky as to ſuſtain no other injury, that is, if no other miſchief was in theſe caſes in general done to the parts contained

tained within the ſkull, the objection to perforation would be real, and great, and the operation a matter of more ſerious conſideration. But this is ſeldom, too ſeldom the caſe; by much the larger number of thoſe, who ſuffer a fracture of the ſkull, are injured with regard to other parts, and labour under miſchief of another kind, additional to the fracture; that is, the parts within the cranium are injured as well as the cranium itſelf. This being the caſe, the loſs or waſte of a little time ceaſes to be an object of ſo great importance. The hazard, which it is ſuppoſed may be incurcurred from laying bare the dura mater, is indeed a matter of ſome weight, ſo much ſo, that it certainly ought not to be done, but for very good reaſons; and yet, although I am clearly of this opinion, I think that I may venture to ſay, that let the ſuppoſed hazard be what it *may*, it cannot in the nature of things, be, by any means equal, to that which *muſt* be incurred by not doing it, when ſuch operation becomes neceſſary. In ſhort, if we would form a right judgment of this point, the queſtion concerning it ought to ſtand thus; is the chance of ill which *may* proceed

from

from merely denuding the dura mater, equal to that, of its not being ſo hurt by the blow, as to inflame, and ſuppurate? Or is the miſchief which may be incurred by mere perforation of the ſkull, equal to the good which it may produce? Theſe queſtions, let thoſe who have ſeen moſt buſineſs of this kind, and who are therefore the beſt judges, conſider and determine. For my own part, I have no doubt, that although by eſtabliſhing it as a general rule to perforate in all caſes, ſome few would now and then be ſubjected to the operation, who might have done very well without it; yet, by the ſame practice, many a valuable life would be preſerved, which muſt inevitably be loſt without it, there being no degree of compariſon between the good to be derived from it, when uſed early, as a preventative, and what may be expected, if it be deferred till an inflammation of the dura mater and a ſymptomatic fever make it neceſſary.

The third conſideration, viz. what proportion the number of thoſe who have eſcaped without the operation, bears to that of thoſe who have periſhed for want of it, is in great meaſure included in the two preceding;

ceding; at leaſt the determination of them, muſt alſo determine this.

My own opinion muſt, till I find reaſon to alter it, be the rule of my own conduct; and though I would not by any means pretend to obtrude the former on any one, yet I think it in ſome meaſure incumbent upon me in this place to give it.

The number of caſes of this kind, which are neceſſarily brought into a large hoſpital, ſo ſituated as Bartholomew's is, in the middle of a populous city, where all kinds of hazardous labour are carried on, has enabled me to make many obſervations on them; and although I have now and then ſeen ſome few of them do well without the uſe of the trephine, yet, the much greater number, whom I have ſeen periſh with collections of matter within the cranium, who have not been perforated, and for whom there is no other relief in art or nature, has, I muſt acknowledge, rendered me ſo very cautious and diffident, that although I will not ſay, that I would always and invariably perform the operation, in every caſe of ſimple fracture; yet the caſe muſt be particularly circumſtanced, the proſpect much fairer than it moſt frequently

is, and my prognoſtic delivered in the moſt guarded apprehenſive manner, when I omit it. I ſhould be ſorry to be ſo miſunderſtood, as to have it ſuppoſed that I mean to ſay, that I think the denudation of the dura mater a matter of abſolute indifference, or that no ill can proceed from it: this, I know is a point concerning which the beſt practitioners have differed, and concerning which, we ſtill ſtand in need of information; but I think I may venture to ſay, what is fully to my preſent purpoſe, viz. that inlarging the opening of a fracture, by means of a trephine, will not produce or occaſion much riſque or hazard, additional to what muſt be occaſioned by the fracture itſelf: that has already let in the air upon the membrane, and therefore that conſideration is, at leaſt in ſome degree, at an end, and the principal point to be determined ſtill remains the ſame, viz. whether upon a ſuppoſition, that the dura mater may poſſibly not have been ſo injured as to inflame and ſuppurate in future, the operation ought not to be practiſed, as a preventative, but, on the contrary, ought rather to be deferred until worſe ſymptoms indicate the neceſſity of it? or whether it ought in general to be performed

early,

early, in order, if poſſible, to prevent and guard againſt very probable, as well as very terrible miſchief?

I know that it may be ſaid, that a fracture, if of any conſiderable ſize, or whoſe edges are fairly diſtant and unconnected, will of itſelf make ſome way for diſcharge from within; and ſo it certainly may, and does, in the caſe of an effuſion of fluid blood; but even in this it very ſeldom proves ſufficient for the purpoſe. But does not the diſtant ſeparation of the edges imply greater ſeparation of the attaching veſſels of the dura mater? and does not experience too often prove this to be the caſe? In truth, the great advantage which is ſometimes derived from conſiderable fractures, is moſt frequent in thoſe caſes where portions of bone are ſo looſe as to be removable, which removal of bone ſtands in place of perforation, and makes much more for the neceſſity of the operation in other caſes than againſt it, if properly conſidered.

I may poſſibly be told that Hildanus, Wiſeman, and others of great and deſerved reputation, have been of the former opinion. I know they have; and when I

differ

differ from theſe, or any other good authority, I hope that I ſhall always do it with caution and diffidence; but I hope alſo, that I ſhall never heſitate to differ from any, and every authority, when I think that I have truth on my ſide, and the good of mankind in my view. The above-mentioned writers, together with almoſt all their contemporaries, had, in ſimple fractures of the ſkull, but one object in contemplation, the extravaſation of blood; this they regarded as the cauſe, both of the early ſymptoms, and of the late ones; conſidering it, as acting either by preſſure or putrefaction; and therefore, when there was no immediate ſign of ſuch extravaſation, from the effects of preſſure, they ſaw no neceſſity for early, or immediate perforation. But had they not forgotten the univerſal adheſion of the dura mater to the cranium? had they not, without any, or indeed contrary to all authority from anatomy, formed to themſelves an erroneous idea of the diſpoſition of thoſe parts, with regard to each other*? Had they conceived rightly of

* Some of the writers of this time, ſpeak of the ſuppoſed vacuity between the dura mater and ſkull, as being

of the conſequences of an inflammation and detachment of that membrane, I am much inclined to believe, that they would have altered their opinion, and not in general have left penetrating fractures of the ſkull to nature; although they had, in ſome meaſure the authority of Celſus for ſo doing *.

Before

ing calculated for the reception of extravaſated fluid, in caſe of accident: which opinion reminds me of that of a much later writer, who ſays, "that the os unguis was "made ſo thin, for its more eaſy perforation in the ope-"ration of the fiſtula lacrymalis."

* "In omni vero fiſſo fractove oſſe, protinus antiqui-"ores medici, ad ferramenta veniebant quibus id exci-"derent. Sed multo melius eſt ante emplaſtra experiri, "quæ calvariæ cauſa componuntur," &c.

CELSUS.

Whoever has an inclination to amuſe himſelf with the different opinions of different writers on the ſubject of perforating, or not perforating, will find them in Palfyn, Rohalt, and many others.

But that the frequent ill effects of neglecting this operation were not unattended to by many, the following quotation, taken from a number of ſimilar ones, may evince.

"Et ſcias, ſicut volunt veteres, quod not eſt excuſatio "ab inciſione, & remotione cranii, cum in eo penetrans "fractura ſit; & hæc propter duo; primo quod os capitis, "ſicut dictum eſt, debilem facit porum. Secundo, quia ſi, "oſſe jam reſtaurato, acciderit interius (quantocunque "modice,

Before I enter upon the account of the preſent and moſt proper method of treating ſimple undepreſſed fractures of the ſkull, it may, perhaps, be not amiſs to make a ſhort inquiry into the opinions which our remote anceſtors have delivered down to us on this ſubject, to take a curſory view of their intention and conduct, and to examine, whether the difference between their practice, and ours be well grounded or not; it being neither antiquity nor novelty, but utility only, which can demand our regard.

That extravaſation of blood, and formation of matter, between the ſkull, and membranes of the brain, were the two principal cauſes, of bad ſymptoms, and of death, in fractures of the cranium, and that

" modicè) generatio ſaniei, vel alicujus humoris ſuper-
" flui expellendi, quomodo, jam reſtaurato oſſe, poſſet
" expelli," &c.

" Primum notabile eſt iſtud, quod in fractura cranii
" debes prohibere apoſtema, ne accidat in cerebro aut in
" panniculis, &c. Tertium, notabile ſit iſtud; quod ſi
" intentio medici ſolum eſſet, in occupatione ſolutionis
" continuitatis, vel fracturæ, ſtante apoſtemate, multa
" mala accidentia poſſent conſequi, ut corruptio panni-
" culi, febris, apoplexia, rigor, &c."

BERTAPAL.

that the only rational method of obtaining relief in either caſe was, by making ſuch an opening in the bone as would give diſcharge to the ſaid fluids, was full as well known to our anceſtors as to us. Their intention and ours therefore were eſſentially alike, and the material difference between our conduct and theirs conſiſts in the manner in, and the inſtruments by, which we endeavour to execute ſuch intention. If the breach in the bone was ſmall, and no ſymptoms of immediate extravaſation attended, their principal apprehenſion was that the ſanies, or matter, which they ſuppoſed muſt neceſſarily be excreted from the edges of the fracture, would drop down, lodge, and be collected on the ſurface of the dura mater.

To prevent this evil, they endeavoured to enlarge the fracture by abraſion of its edges, by means of ſcalpra, or rugines. Theſe ſcalpra were many in number, and various in their ſize and figure, according to the opinion or whim of the practitioner. Figures of theſe are to be ſeen in many writers; in Andreas a Cruce, in Sculteſus, in Fabritius ab Aquapendente, in

Beren-

Berengarius, &c. &c. &c.* But whoever examines them, and attends to their propoſed uſe, will find them liable to great objection; he will find that the uſe of them muſt be irkſome to the patient, tedious to the operator, and unequal to the end propoſed. That by ſuch kind of inſtrument the opening of a ſmall fracture may be enlarged, is beyond all doubt; but if the breach be at all large, or of any length, ſuch method of enlarging it muſt at beſt be a very operoſe one; it muſt jarr, and ſhake the patient's head immoderately; if executed unſkilfully, or inattentively, it muſt be attended with hazard of wounding the dura mater; and, when finiſhed, could not properly anſwer the purpoſe for which it was deſigned.

Of theſe defects, ſome of the practitioners were in ſome meaſure ſenſible; and therefore, if the fracture was of ſuch ſize, or ſo circumſtanced, that theſe ſcalpra abraſoria

* "Ex fracturis vero quæ ad cerebri membranas perveneruntſi ſimplex fractura ſit, anguſtis ſcalpris utendum; ſin cum contuſione aliqua, quod contuſum eſt excidi debebit; idque vel terebellis prius in circuitum foratum, ac mox ſcalpris admotis, vel protinus ab initio cycliſcis." GALEN.

ſoria would moſt probably prove inſufficient, that is, if the accident was produced by ſuch force, or attended with ſuch degree of contuſion, as to render it probable that the parts within were injured, they did not then depend upon this method by abraſion, but had recourſe to others, by which they removed a portion of the cranium *. In the execution of this purpoſe alſo, they found themſelves ſubject to many inconveniences, ariſing partly from the awkward and unmanageable form and make of their inſtruments, and partly from the inartificial manner in which they applied them.

Terebræ, and terebellæ, of various ſorts, figures and ſizes, the cycliſcos, or ſcalper exciſorius, and a variety of modioli were invented, and uſed for this purpoſe, figures of which may be ſeen in Vidus Vidius's comment on Hippocrates de vuln. capit. in Peter Paaw on the ſame; in Andreas a Cruce's officina; in Albucaſis and others.

If the piece of bone intended to be removed was larger than could be comprehended

* "In iis quæ uſque ad cerebri membranam diviſa "ſunt, ſi ſola rima ſit, iiſdem radulis utendum; ſi colliſio aliqua una ſit, terebris exſcindere colliſum oportet, ſcalpris adhibitis." ORIBASIUS.

hended within the modiolus then in uſe, and which was a very defective inſtrument in many reſpects, the operation was performed by means of terebræ; which operation was ſtill more coarſe, more fatiguing, and more hazardous than that by the mere ſcalpra.

The piece intended to be taken away was ſurrounded with perforations, made at ſmall diſtances * from each other, and then either

* " Miniſtri juxta aſſideant, quorum unus caput læſi " contineat, alter, opportuna miniſteria faciat. Aurium " foramina lana coacta obturanda ſunt, ne ſonitu in ex- " ciſione terreatur. His factis, infigendus calvariæ eſt " mucro acutus terebræ; qua læſum os colorem mutavit, " juxta integrum; deinde lente habena terebram conver- " tere debemus, donec inciſo oſſi mucro inſiſtat; ac " tum citatius circumagere oportet habena terebram " convertente, donec mucro in ſpacium inter duplex " os deſcendat; ubi autem foramen altius adactum ſit " ultra craſſitudinem ſpatii inter duplicem teſtam oſſis " quod perforatur, tum terebra multo circumſpectius " convertenda eſt, ne repente deſcendens cerebri mem- " branam violet. Cum jam terebra adacta fuerit, ut " vel conjectura deprehendatur totam oſſis craſſitudinem " eſſe perforatam, vel perparum ſolidæ ſedis infra relic- " tum, tunc is qui operatur, altitudinem deguſtet de- " miſſa tenuis acus obtuſa parte; ac ſi quid continuæ ſe- " dis etiam reliquum ſit, deprimendus altius terebræ mucro " eſt, eaque lente circumacta, ſolidum os perforandum. " Eadem quoque facienda ſunt in aliis foraminibus, do- " nec rima in ambitu perforata ſit. Septa vero media inter

" foramina

either the ſcalper exciſorius or the ſcalprum lenticulatum was introduced, and, by means of repeated ſtrokes with a heavy mallet, was driven thro' all the interſpaces between each perforation. By theſe means the portion of bone ſo ſurrounded was removed, and the dura mater was laid bare. The tediouſneſs which muſt attend the making ſo many perforations, the diſturbance given to the patient's head, as well by the terebra, as by the mallet and chizel, the

" foramina ſatis habent ſpatii, fere quantum ſpecilli an-
" guſti averſa pars eſt. Factis foraminibus, tum ad ex-
" ciſionem, quæ dicitur, veniendum eſt, ut exciſis tum
" foraminibus tum mediis, læſa oſſa removeantur."

ORIBASIUS.

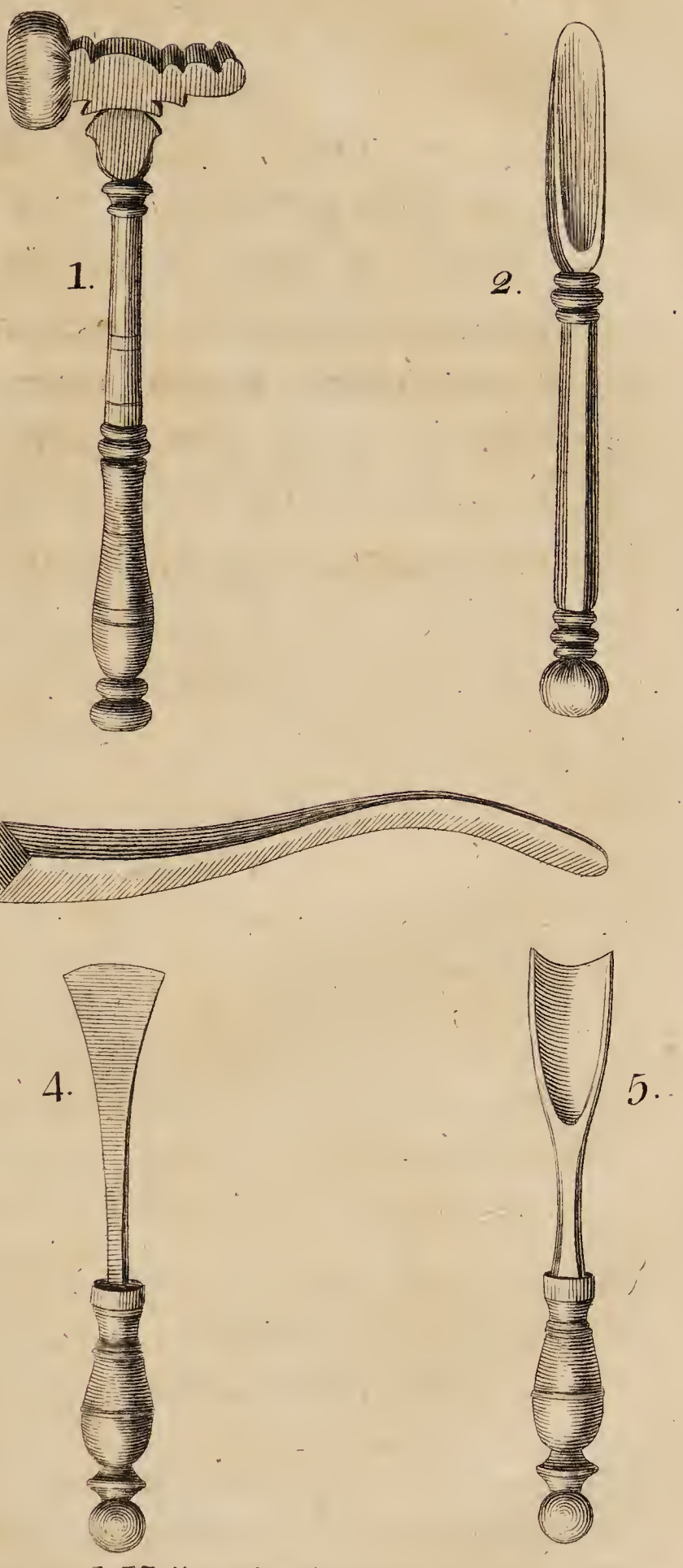
" Modus autem perforationis eſt, ut figas unum tryp-
" panorum (terebrarum) ſuper os in circuitu, & revol-
" vas ipſum intra manus tuas, donec ſcias quod os tere-
" bratum eſt; deinde fiat permutatio ad alium locum:
" & ſic permutatio fiat uſque ad ultimum neceſſitatis.
" Deinde cum alio inſtrumento, quod dicitur ſpatumen,
" ab uno foramine uſque ad aliud os incidatur, &c."

BRUNUS Chir. Mag.

" Pone trypanum ſupra os circa ſciſſuram, ubi vis fo-
" ramen facere, & revolve ipſum intra manus tuas do-
" nec penetret; deinde muta ipſum ad alium locum, &
" ſic fac tot foramina, quot ſufficiant; deinde pone ſpa-
" tumen in uno foraminum, & levando manum, ſupe-
" rius incidatur terminus, qui eſt inter foramen & fo-
" ramen, & fac ſic donec ſeparatur os totum."

BRUN. Chir. Parv.

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1. *Malleus plumbeus.*
2. *Cyclisos.* 3. *Meningophylax.*
4. *Scalper planus.* 5. *Scalper cavus.*

the hazards of wounding the membranes of the brain, and the coarſeneſs and unhandineſs of the whole proceſs, are too obvious to need a comment*. Of

* " Quod vero per cycliſcos opus adminiſtratur, ne id " quidem omnino vitio caret, quum quatiat immodice " caput, quod potius quietem poſtulat." GALEN.

" At quæ per terebellam ratio quidem fungitur, parum " tuta eſt, propterea quod dum audacius eam tractant, " duram meningem non raro violant." GALEN.

" Sæpe ſcalpros pulſantes adeo ut totum cerebrum " permoveatur." GALEN.

" Acuta terebra quamplurimas anguſtas perforationes, " cranii fracturas ambientes, radioli craſſitudine equidiſtantes formare ſolent; quod vero inter foramina reſidet, aut rectis, aut curvis ſcalpris malleolo plumbeo " adactis recindere expedit. Lenticulato ſcalpro, adacto " malleolo, id fieri poteſt; *horridus* tamen quidem modus eſt, ac in opere tardus."

" Scalpra hæc omnia citra malleoli operam nullius " momenti ſunt; moventur neceſſario malleolo adacto, " præſertim in rimis, quæ ad diploidem uſque pertingunt; excavant totum os, *forti adhibita percuſſione, non tuto ſed incommode.*" ANDREAS a CRUCE.

" Malleus ad percutiendum lenticulatum debet eſſe de " plumbo, ut in parva quantitate magis ponderet." GUIDO.

" Cavere oportet, ut in terebellæ admotione, ne falleris, verum qua parte craſſiſſimum os eſſe viſum fuerit, " in eam ſemper terebellam admotam adigito." HIPPOCRAT.

" Sæpe accidit, ut terebræ repente adactæ, ob naturalem perforatorum oſſium debilitatem, vel tenuitatem, membranam ſauciarint." ORIBASIUS.

Of this moſt of them were ſenſible; they felt the inconveniencies, and dreaded the danger ſo much, as to run into great abſurdities, merely to avoid them. They found that they not only wounded the dura mater, but ſometimes the brain itſelf; and therefore had recourſe to ſuch precautions, as they thought moſt likely to prevent theſe evils. By ſome we are adviſed, not to make the perforation quite through the bone, but to endeavour to leave a thin lamina of it intire. By others, to leave the piece, which the modiolus or terebra had ſurrounded, adhering to the dura mater, to be caſt off by its ſuppuration, leſt the haſty detachment of it ſhould be miſchievous *.

The

* "Quod ſi ſtatim initio vulneris inflicti, curationi "adhibearis, os ad membranam uſque ſimul & ſemel ex- "ſcindere non oportet, &c. Præterquam quod aliud "ſubeſt periculum, ſi ſtatim ad membranam uſque au- "feras, ne inter operandum membranam lædas. Sed "inter ſecandum id obſervato, ut poſtquam eo res per- "ducta, ut parum abſit quin univerſum os pertuſum "ſit, jamque os vacillare incipit, ab ulteriore ſectione "abſtineas, oſſique, ut ſponte porro ſecedat, permittas. "Namque oſſi, quod ſectum eſt, & ſine exſectione re- "lictum, nihil detrimenti accidere poteſt."

"Cum itaque terebræ occurrit uſus, ſi ſtatim curati- "oni adhibearis, caveſis ne ad membranam uſque pene- "trat, verum portio oſſis tenuis relinquenda." Hippo.

The cautions laid down by Hippocrates and others, concerning the part of the bone whereon to fix the inſtrument, and the great attention which they admoniſh the operator to pay to its execution, all proceed from the ſame fear. For the ſame reaſon, or from the ſame well-grounded apprehenſion, it will be found that many of the beſt practitioners endeavoured to furniſh their perforating inſtruments with ſuch guards or defences as ſhould prevent them from going too deep *.

In

* "Terebellis autem ipſis, ut mergi non poſſunt ſu-
"pra cuſpidem, nonnulli ſupercilium extans efficiunt."
GALEN.

"At quia dum terebrum hoc circumagitur, periculum
"imminet ne membranæ lædantur, ideo nonnulli quo
"minus abberrarent, & hoc periculi genus evitarent,
"terebras excogitarunt quæ mergi non poſſunt, & ob
"id a Græcis abaptiſta dicuntur."
ANDREAS a CRUCE.

"Si autem os forte durum eſt, tunc oportet ut perfores
"in circuitu ejus, antequam adminiſtres inciſoria cum te-
"rebris, quæ nominantur terebræ non profundantes; &
"non nominantur ita, niſi quoniam ipſæ non pertranſeant
"terminum oſſis, ad illud quod eſt poſt ipſum, propterea
"quod terebro eſt extremitas rotunda ſuper illud, quod eſt
"ſub capite ejus acuto, ſimilis margini, & circulus par-
"vulus prohibet ſubmergi & pertranſire ſpiſſitudinem oſſis.
"Et convenit tibi, ut accipias ex iſtis terebris numerum
"multum,

In Albucaſis, in Andreas a Cruce, and many others, are figures and deſcriptions of modioli, duabus, tribus, vel quatuor alis muniti, of thoſe as well as of terebellæ, called abaptiſtæ, meſpilatæ, torculatæ, &c. the number and variety of theſe is very large, although they are all formed upon the ſame principle, and all calculated for the ſame purpoſe, viz. to perforate the ſkull without wounding the membrane underneath.

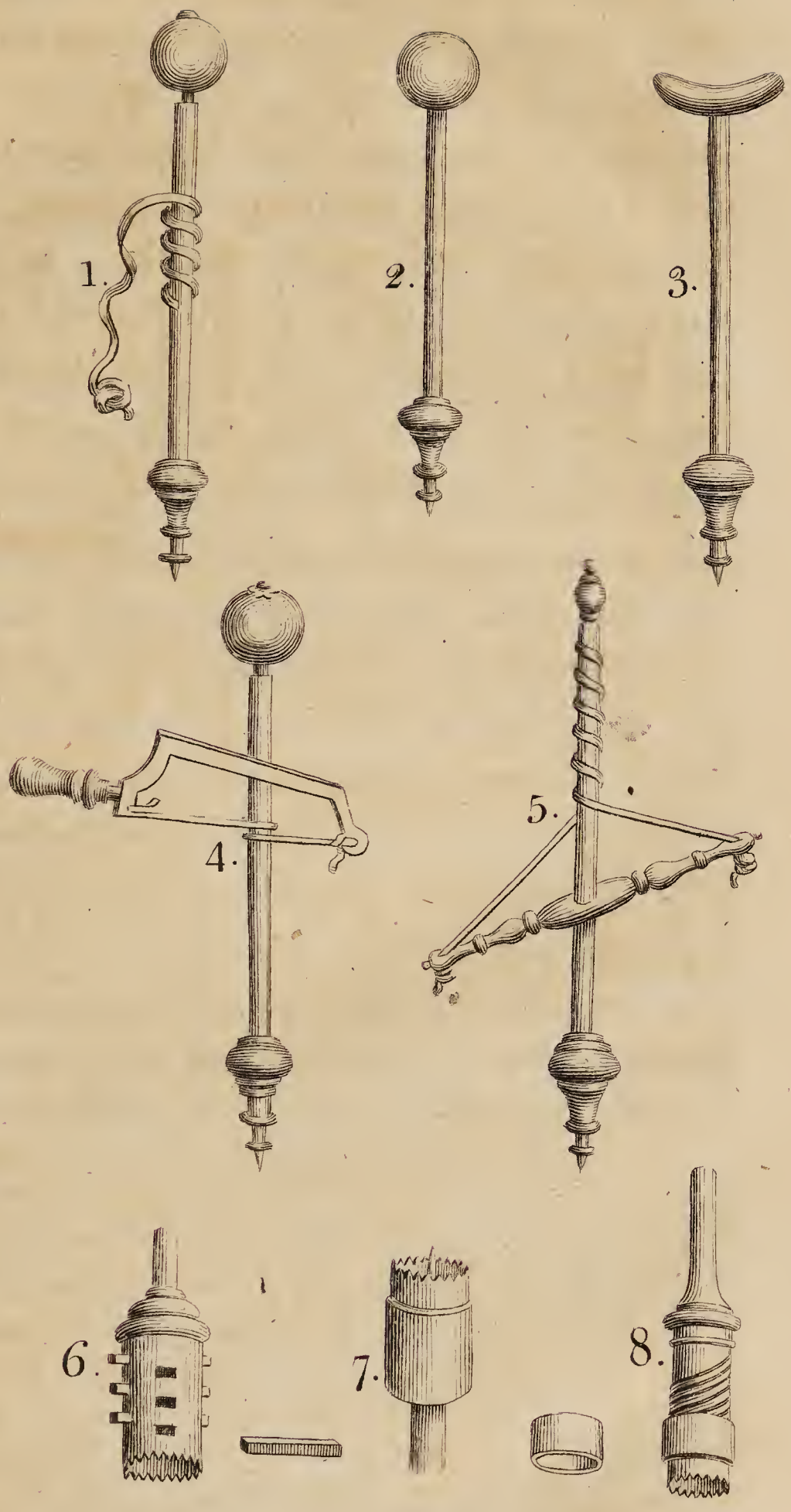
" multum, quorum unum quodque conveniat quantitati " ſpiſſitudinis oſſis, donec præſens ſit tibi omni cranio " terebrum," &c. ALBUCASIS.

" Modiolus fuit veteribus duplex, eſtque etiamnum " hodie vulgaris, tum & qui duplicem habet orbem, al- " terum ſupra alterum extantem. Hic abaptiſtos Græ- " cis; facit namque orbis ſive limbus extans ne profun- " dius mergi queat. Hunc itaque deſcribit Galenus 6. " meth. cap. 6. Quidem autem quo minus aberrarent, " tales terebellas excogitarunt quæ mergi nequeant, " quas inde abaptiſta vocant. Circumcurrit enim pa- " rum, ſupra terebellæ ſupercilium circulus alius parvus. " Sane expedit complures id genus ad manum habere, ob " quamcunque cranii craſſitudinem; nam craſſiori lon- " gior convenit terebra, tenuiori brevior," &c.

PET. PAAW in HIPPOCRAT.

" Si autem validum fuerit os, prius illud terebellis " abaptiſtis vocatis perforatur. Ejuſmodi vero ſunt quæ " paulo ſupra acumen cuſpidis eminentias habent, im- " pedientes ne ad cerebri uſque membranam demergi " poſſint." PAUL. ÆGINET.

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1.2.3.4.5. *Guarded Tenebræ.*

6.7.8. *Guarded Modioli.*

derneath. But whoever will conſider the very different thickneſs of different ſkulls and of different parts of the ſame ſkull, and at the ſame time reflect on the extreme awkwardneſs of all theſe inſtruments, will immediately ſee, how very little dependance is to be laid on ſuch defences, and how miſchievous the uſe of them muſt very frequently have proved. In ſhort, an attentive conſideration of what our remote anceſtors have delivered down to us on this ſubject, may ſatisfy us that their obſervations on the appearances and ſymptoms of the ills attending this kind of miſchief, that is, fractures of the cranium, were in general extremely juſt and true, (perhaps more ſo than thoſe of many moderns) that there curative intention, or method of aiming at the relief or cure of ſuch ills, was rational and juſt; but, that the inſtrumental part of their art was ſo deficient, ſo awkward, and ſo unhandy, that they were thereby, not only in general prevented from accompliſhing the good they intended, but were not infrequently driven into almoſt unavoidable miſchief.

Reduction of the number of inſtruments to be uſed in an operation, and an extreme ſimplicity

ſimplicity and plainneſs in thoſe which may be required, are a part of the merit of modern ſurgery.

The majority of the inſtruments, with which our anceſtors perforated the cranium, were contrived to make way for the admiſſion of other inſtruments; ſuch as the ſcalper exciſorius, the cycliſcos, the ſcalprum lenticulatum, &c. with which they removed a portion of bone. Even the modioli, which were uſed by them, were ſo ſmall in the diameter of the ſaw, as to take away a very ſmall piece at each application; which circumſtance neceſſarily leſſened the benefit which might be expected from the uſe of it, and rendered its repetition more frequently neceſſary than it needed to have been, if it had been made larger.

Inſtead therefore of that ſtrange variety, and multiplicity of inſtruments, which I have already mentioned to have been uſed by them, we now require only a trephine of ſuch a ſize as to remove a ſufficient quantity of bone at once, and an elevator; or perhaps, now and then, a pair of forceps. Theſe are all we ever can want; and theſe may be ſo made, as to be manageable by the hand of any man of common judgment,

ment, with great eaſe to himſelf, with very little fatigue and no hazard to the patient. With theſe we can make as large or as ſmall an opening in the ſkull as we pleaſe; either for the relief of the dura mater, for the diſcharge of blood or matter, or for the elevation of depreſſed or extraction of looſe pieces of bone, and that without diſturbing the patient greatly, or incurring any riſque of wounding the brain or its membranes *.

I have already ſaid, that what are called the principal and diagnoſtic ſigns of a fractured

* It has been cuſtomary to make the handle of the trephine of iron, and to form the extremity of ſuch handle in ſuch manner, as to make it ſerve the purpoſe of an elevator; thus combining, as it were, two inſtruments in one. This, I think, is a great fault; ſuch iron handle adds conſiderably to the weight of the inſtrument, and that in a wrong part of it; and thereby renders it leſs manageable. The handle of this inſtrument ſhould be made of light wood, not too long, and of an octangular figure. Whoever will try the ſame inſtruments, thus differently made, will, I think, be immediately ſenſible of the preference due to the lighter handle. It is almoſt impoſſible for the handle of an inſtrument, whoſe point or extremity is to be worked with, to be too light. It is no uncommon thing to ſee couching needles, and inſtruments of like kind, laden with heavy bone handles, the inconvenience of which is too obvious to mention.

tured ſkull are by no means to be depended on, as indicating ſuch miſchief to exiſt; it can therefore be hardly neceſſary to obſerve, that what are called the uncertain ſigns require our regard ſtill leſs. Theſe have been mentioned by many writers, who have copied each other; ſuch are, the holding a ſilk or horſe-hair tight between the grinding teeth and the hand, and the making it vibrate by ſtriking on it; the biting an hard body, and attending to the pain produced by ſuch action, with ſeveral other of like ſort; which, not to mention that they imply the patient to be ſenſible and intelligent, are ſo truly equivocal as to deſerve no notice *.

All conſiderations alſo, which are drawn from the manner in which the violence was given or received, from the weight or kind of weapon or body inflicting it, from the force of the blow, the height of the fall, &c. are all equally fallacious; for every body knows that very terrible ſymptoms and

* "Item percutiatur caput cum levi bacculo ſicco, "de ſalice aut de pino, & pone aurem tuam apud ca- "put; & ſi ſanum eſt, tunc audies ſonum ſanum; ſi "fractum aut ſciſſum, audies ſonum mutum."

LANFRANC.

and conſequences are ſometimes produced by accidents ſeemingly ſlight; and, on the contrary, that people often eſcape unhurt, from what might reaſonably have been expected to have proved prejudicial to them. In ſhort, nothing but the ſight and touch are to be at all depended upon.

If the integuments are not wounded, or if the wound made in them be ſo ſmall as not to admit a proper examination of the bone, and the circumſtances of the caſe are ſuch as render ſuch inquiry neceſſary, a portion of the ſcalp ſhould be removed. The manner of doing this has formerly been the occaſion of much difference of opinion; but there can be no doubt about the greater propriety of removing a piece of the ſcalp for this purpoſe, by an inciſion in a circular form, it being that form which muſt afford the cleareſt view. If there be no wound, the point ſtricken ſhould be made the center of the inciſion; if there be a wound, ſuch wound ſhould be made the center of the piece to be removed; and ſuch piece, ſhould always be of ſize ſufficient to render the application of the trephine eaſy*. If

* It may perhaps be remarked, that through the whole

of

If the ſcalp be wounded, and the wound be large enough to render the fracture viſible, the courſe of that muſt be the operator's direction in making his inciſion; and, if the ſkin be much torn and bruiſed, or ſpoiled, it will generally be found adviſeable to take away all that is ſpoiled at once; as the removal of it will add very little to the patient's pain, or the length of the cure, and the leaving it on, in this ſtate, may be attended with great future inconvenience.

Scalping (as it is called) ſhould always be executed with a knife, and that knife ſhould be ſo held as to cut through the ſkin and pericranium, in a perpendicular manner, down to the bone at once, that the ſize of the bare bone may be fully equal to that of the wound in the ſcalp.

It is hardly neceſſary to inſert a caution againſt preſſing hard with the ſcalping knife, in the caſe of large fractures, attended either

of this treatiſe, whenever I have occaſion to ſpeak of the operation of perforating the ſkull, I mention the trephine only, and take no notice of the trepan, the inſtrument uſed by moſt of our immediate fathers, and ſtill in uſe through almoſt all France; my reaſon is, that the latter is an unmanageable one, and liable to moſt of the hazard and inconvenience attending the terebræ and terebellæ.

ther with great ſeparation of the broken edges, or with looſe pieces, the danger is ſo obvious. And it is alſo as obvious, that there can be but one method of avoiding ſuch hazard, viz. by removing the ſcalp from, or rather making the inciſion in a part beyond, the fracture, and where the bone is firm and ſtable. By theſe means, not only the riſque of hurting the membranes and brain will be avoided, but the whole miſchief will be more fairly and clearly brought into view; a thing, which ſooner or later muſt be done, and is always beſt done at firſt. No part of the ſcalp ſhould be wantonly or unneceſſarily cut away: but it ſhould always be remembered, that this operation is, and ſhould be performed, with intention to bring, if poſſible, the whole fracture into ſight; and that whatever falls ſhort of fulfilling ſuch intention (if practicable) is wrong, not only, as it does not immediately anſwer the purpoſe for which it is intended, but it generally puts the patient under a neceſſity of undergoing the ſame pain and trouble a ſecond time.

When the cranium is laid bare, it may not be improper to remark, that writers in general have cautioned us to beware of

miſtaking either a ſuture, or the impreſſion of a veſſel on the ſurface of the bone, for a fracture: I ſay, that they have in general cautioned us not to miſtake one of theſe for the other, but have not informed us of the mark by which we may be enabled to make the neceſſary diſtinction, although ſuch mark is almoſt conſtant and invariable. From the track of a fracture, or fiſſure, the pericranium is always found looſe and detached; whereas to the arterial ſulcus, and to the uninjured ſuture, it is always adherent; beſides which, the edges of a fracture will always be found rough to the probe or finger, and the ſulcus always ſmooth; not to add, that the diſpoſition of the ſutures is pretty certain, and their appearance in general not extremely like to that of a fracture.

When the ſcalp is much bruiſed, or wounded, ſuch wound or bruiſe points out the place from whence the piece ſhould be removed, in order to examine the bone; and, even although no fracture ſhould be found, is an authority and vindication of ſuch operation, eſpecially if the general ſymptoms were at all urgent; ſuch ſymptoms implying miſchief ſomewhere, and

ſuch

ſuch external mark rendering it clear, where the external violence cauſing ſuch miſchief was inflicted. But all the ancient, and many of the modern writers ſpeak of a particular kind of fracture, in which the ſcalp covering it is perfectly fair and uninjured; and this they call a contra-fiſſure. By the general account, it is pretty clear, that the majority of thoſe who have ſpoken of this kind of fracture have ſuppoſed that the breach made in the bone was moſt frequently in the part of the cranium diametrically oppoſite to that which received the blow; this the term contra-fiſſure implies, and this they moſt certainly do in general mean ſhould be underſtood by it, as appears by their directing us to examine and to remove the oppoſite part of the ſcalp, if no miſchief be found under the part ſtricken, and the patient labours under what are called the ſymptoms of a fractured ſkull.

If the ſymptoms of a fractured cranium were certain, and to be depended upon, this accidental circumſtance, of a breach in the bone, having been now and then found in a diſtant, or even in the oppoſite part, might be an inducement to look for ſuch miſchief there, when it is not found under

the part ſtricken. A fracture, we might then ſay, there is ſomewhere; and it having, in ſome inſtances, been found in the oppoſite part of the head, it might be right to look for it there. But, as what generally paſs for, and are called the ſymptoms of a fractured ſkull, are by no means to be depended upon, as indicating ſuch complaint to exiſt any where, as they are producible by concuſſion, by extravaſation, by contuſion, &c. and are frequently found where the ſkull is intire and unhurt, they cannot be deemed a ſufficient authority for removing the ſcalp where no apparent mark of violence is left. The ſmalleſt degree of wound or bruiſe will, in caſes where the ſymptoms are urgent, vindicate the removal of ſcalp from ſuch part; but where there is no local indication where to operate, I cannot ſee any vindicable reaſon for operating at all *.

The

* Morgagni, in his book de Cauſis & Sedibus, has very juſtly obſerved, "that if by contrafiſſure was meant "a breach in that part of the cranium which is diame- "trically oppoſite to the part wounded or bruiſed, (as "ſome have affirmed) there could be none of that diffi- "culty which they all allow of finding, or that frequent "diſappointment in not finding it at all, ſince an inqui- "ry into ſuch oppoſite part, muſt always have led to the "diſcovery.

The chirurgical intention in perforating the ſkull, in the caſe of ſimple undepreſſed fractures, is, as I have already obſerved, either to give immediate diſcharge to fluid, ſuppoſed to be extravaſated between the cranium and membranes of the brain; or to obviate, and prevent ſuch ills, as may moſt probably be expected to ariſe from the contuſion cauſing the fracture; or to let out matter already formed in conſequence of the inflammation following ſuch contuſion.

In each of theſe it is moſt probable, that the miſchief, be it which it may, either is or will be ſeated principally under the track of the fracture; and therefore, whenever the trephine is applied for either or any of theſe purpoſes, it ought always to be ſet on in ſuch manner as that the fracture ſhould, if

" diſcovery. So that inſtead of the term *oppoſite*, that " of *another*, part of the cranium ought to have been " uſed." And then the whole of this, which has puzzled ſo many, will amount to no more than what every practitioner muſt know, which is, that we frequently find, in caſes of great violence, that the ſkull has been broken, in a place very diſtant from that which received the blow, and which we are not led to the knowledge of by any apparent external mark.

if poſſible, traverſe the circle deſcribed by the ſaw, or at leaſt, ſo that the inſtrument might always comprehend the fracture within it.

I am aware that the direction given by moſt of the old writers on this ſubject is very different from what I have mentioned; but the inſtruments with which they operated, were ſo different from ours, and the advantage ariſing from the comprehenſion of the fracture within the trephine are ſo great, and ſo manifeſt, that I muſt take the liberty of inculcating a conſtant attention to it, as to a circumſtance from which great advantages are derivable.

The ſaw or crown of the trephine ſhould never be too ſmall, eſpecially if the patient be full grown; a circumſtance which I thought it right to mention, becauſe the inſtrument-makers are very apt to make them ſo *.

The

* The beſt practitioners have, at times, found themſelves neceſſitated to apply the inſtrument repeatedly in the ſame caſe, in order to remove a conſiderable quantity of bone; and among the writers on this ſubject, are frequent relations of ſuch facts. The practice is undoubtedly juſt and right; but I cannot help thinking, from what I have ſeen of the perforating inſtruments of many

The number of perforations which it may be neceſſary to make, can only be determined by the nature of each individual caſe.

If the operation be performed on account of ſuch ſymptoms as ſeem to indicate a bloody extravaſation, and ſo free a diſcharge is produced by one opening, as alleviates or removes the ſymptoms, that one may be all that may be neceſſary; but if the firſt perforation only diſcovers the diſeaſe, and is not followed by ſuch diſcharge as relieves, or removes the ſymptoms, the operation ought to be repeated again and again.

If there be no ſymptoms of extravaſation, and the inſtrument has been applied in a preventative ſenſe merely, the length of the fracture muſt determine the number; one or two only may be made at firſt, and it may be right to wait for farther direction from future circumſtances. The circumſtances

many of our predeceſſors, that a part of their trouble, and of the fatigue of their patients in ſuch caſes, might have been much leſſened, had the circle of their ſaw been larger. The advantage of a large circle is great; the inconvenience imaginary.

ſtances which may render a repetition of the operation neceſſary are, acceſſion, or increaſe of fever; large diſcharge of matter, or lodgment of the ſame fluid; inflammatory tenſion of that part of the dura mater, which has already been denuded, &c. Directions to be given by a writer can, on this ſubject, be only and truly general; all the reſt muſt be left to the judgment of the ſurgeon, which judgment muſt be formed from the peculiar nature of each individual caſe.

When the operation has not been performed as a preventative, but to give diſcharge to that matter which a ſymptomatic fever indicates to have been formed, the quantity of ſuch fluid, the extent of the ſeceſſion of the dura mater, and the ſtate of that membrane, muſt determine the conduct of the operator. The only chance of relief is, from laying bare a large portion of it, that the diſcharge may be as free, and the confinement as little as poſſible; nothing but this can do good, the ſpace of time in which it may prove beneficial is very ſhort, that once elapſed is abſolutely irrecoverable, and the neceſſary operation for obtaining ſuch end may full as well be totally neglected, as done by halves, or too late.

The

The extent of the injured and ſeparated dura mater, and conſequently of the vacuity for the formation and lodgment of matter, is a thing of ſo much conſequence, that it is to be wiſhed we were able to diſcover it with more preciſion and clearneſs than we ſeem to be able to do. It is the greateſt circumſtance of hazard to the patient, and of direction to the ſurgeon. It is that which, if undiſcovered or neglected, muſt deſtroy the former, and that, which when diſcoverable, and attended to by the latter, is not only his information, but his vindication.

The concealment of the dura mater within the cranium is one great cauſe of this great obſcurity. This neceſſarily prevents us from knowing the true ſtate of the ſaid membrane, as much and as certainly as it is to be wiſhed we could; but ſtill I cannot help thinking, that there are ſome circumſtances and appearances, as well before perforation as after, which, if carefully and duly attended to, may throw ſome light on this obſcure part of ſurgery. For example, if, upon dividing the ſcalp, the pericranium is found to be altered, and perfectly ſeparated from the ſkull to which it ought naturally

to

to adhere; or if, ſome few days after ſcalping,(as it is called) the edges of ſuch wound ſpontaneouſly quit their adheſion to the bone all round, to ſome diſtance, and inſtead of being firm, florid, and healthy, become looſe, tawney, and flabby; or if the ſkull, upon being denuded, is plainly of a colour different from that of a healthy ſound bone, with a healthy ſound membrane under it; or if ſuch bone, after having been either accidentally or deſignedly laid bare, undergoes ſuch morbid change of aſpect, and the patient is at the ſame time reſtleſs and feveriſh, with tenſive pain in the head, and irregularly returning fits of heat and chilline ſs; I think, that we may moſt reaſonably preſume, that the dura mater in ſuch patient is inflamed; and that the ſeat of ſuch inflammation is under ſuch bare and altered part of the ſkull.

This preſumption, as I have juſt obſerved, may take place before perforation; but, if added to theſe circumſtances, which appear before the operation, we find upon perforating that the membrane is inflamed, detached, altered from its natural texture and brightneſs, or ſmeared over with matter, the caſe is then clear, as to its nature; and

it

it is as clear, that nothing but the removal of a conſiderable portion of the ſkull can either give room for the inflammatory tenſion of the membrane, or make way for the diſcharge of matter generated on its ſurface, the two circumſtances on which the well-being of the patient depends, the two intentions which muſt be fullfilled, and which nothing but free perforation can enable us to fulfil. Whatever degree of hazard may be ſuppoſed to be incurred, by having expoſed the dura mater to the air, cannot be increaſed by the mere comparative ſize of the opening; and if we may be allowed to expoſe our patients to any riſque at all, it can only be upon a ſuppoſition, that a greater degree of good may be deducible from it.

It ſometimes happens, that one of the bones of the ſkull is cracked, and the dura mater underneath ſuch crack is ſo injured as to become inflamed, and in proceſs of time to ſuppurate; but there being no early or immediate ſymptom of ſuch miſchief, and the ſcalp being neither wounded nor bruiſed in ſuch manner or degree as to authoriſe the removal of the ſcalp, the true nature of the caſe is not known, nor the

impending

impending miſchief attended to, until the ſymptoms of inflammation begin to appear. In this ſituation, after an uncertain number of days, (ſometimes more, ſometimes leſs) the patient finds himſelf out of order; is reſtleſs, does not get natural or quiet ſleep, is fluſhed and chilly by turns, feels pains of the dull tenſive kind all over his head, but particularly in the part where the blow was inflicted. Soon after he has got into this ſtate, the part ſo pained becomes in ſome degree tumid, the febrile ſymptoms advancing notwithſtanding every internal aſſiſtance. If in theſe circumſtances the tumid part of the ſcalp be divided, and the cranium be found bare, (the pericranium having ſpontaneouſly quitted its adheſion) whether it be broken or not, miſchief is certainly forming * underneath it, and the one remedy is perforation.

It alſo ſometimes happens, that a fine capillary fiſſure runs, or is continued, under an

* Oſſium rima occulta interdum non ante ſeptimum diem, interdum non ante decimum quartum, interdum ſerius ſe oſtendit, tum caro ab oſſe recedit; tumque os lividum apparet; dolores item ichorum diffluentiam excitantur; atque hæc difficulter remediis cedunt." HIPPOCRATES.

an undivided part of the ſcalp, from the extremity of a fracture to a diſtance greater or leſs; or, in other words, the fracture in its track, from being open and apparent, becomes capillary, and is either not ſeen or not attended to. If the dura mater, under ſuch fiſſure, does not become inflamed, it may poſſibly never give any trouble; but if it does become inflamed and ſuppurate, the ſcalp covering ſuch fiſſure will, at the end of ſome days, ſwell, and become tender to the touch; the pericranium will, by ſeparating from the bone, form a ſinus along the track of the fiſſure, a diſcharge of gleet will be made from it upon preſſure, and the diviſion of it will diſplay the breach in the bone.

Notwithſtanding the fracture from which this fiſſure is continued be large and open, and the trephine may alſo have been more than once uſed to ſuch fracture, yet, when the appearances are ſuch as I have related, if the patient be not entirely free from all general ſymptoms of inflammatory miſchief, it may be depended upon, that the membrane under the fiſſure is diſeaſed, and if a convenient opening be not made upon the part aggrieved, bad conſequences will follow,

low, notwithſtanding all that may have been done to the more viſible and open part of the fracture. A very ſtrong and convincing proof of the nature of a local inflammation of the dura mater, as well as of the moſt proper method of treating ſuch diſorder.

In caſes of great violence offered to the head, whether the ſkull be broken or not, it ſometimes happens, more particularly in young ſubjects, that we find a ſuture conſiderably disjoined; in which circumſtance I do not remember ever to have ſeen one ſingle inſtance of a recovery *.

I cannot take leave of this ſubject without reminding the young practitioner, that although it be impoſſible for any one, in the caſe of highly inflamed or ſuppurating dura mater, to get well without perforation of the ſkull, yet that operation muſt be conſidered only as one abſolutely neceſſary part of the proceſs toward obtaining a cure; and that

* "Repentina ſuturarum disjunctio, ſi cauſam attendas, ſine aliqua cerebri concuſſione eſſe non poteſt: ſi effectum, non ſine violenta craſſæ meningis, illuc magis adhærentis diſtractione, ac annectentium fibrillarum ac vaſculorum laceratione," &c.

MORGAGNI de Cauſis & Sed.

that phlebotomy, gentle evacuations per anum, proper febrifuge remedies, and a ſtrict low diet and regimen, will be full as neceſſary after ſuch operation as before it. The removal of a piece of bone takes off ſome preſſure from the tenſe and inflamed membrane, frees it in ſome degree from its confinement, and gives diſcharge to matter and gleet; but it does no more; and every means which can ſerve to appeaſe the febrile heat, to leſſen the velocity of the circulating fluids, to render the ſkin perſpirable, and the patient cool and eaſy, are full as neceſſary after as before ſuch operation.

CASE

CASE XVII.

Simple Fracture.

A Principal overſeer of one of the great roads near to this town was thrown down with great violence, while he was giving directions to the labourers. He fell with his forehead againſt a ſharp ſtone, and lay ſenſeleſs for a few minutes, but ſoon recovered himſelf and walked home. The ſtone had made a conſiderable wound, the lips of which were ſo torn and bruiſed, that the ſurgeon who firſt ſaw him cut them away, and by that means detected a fracture, or rather a fiſſure, of about an inch and half or two inches in length, on the upper or middle part of the os frontale. The man had neither ſickneſs, giddineſs, vomiting, fever, nor any other bad ſymptom for ſeveral days; on which account nothing was done to the fracture, which was dreſſed with dry lint only. He was twice let blood, and kept to a low cool regimen. At the end of ſeven days, he found himſelf ſo well, that he was deſirous of going out; but that not being permitted, he

he ſtayed at home, and took great care of himſelf. On the eleventh day he found himſelf out of order, ſaid that his head ached, that his ſtomach was not right, and ate no dinner. The following night he got but little reſt. On the thirteenth day, having paſſed very unquietly the preceding night, he did not riſe; and when his ſurgeon came to dreſs him, finding him feveriſh, he let him blood, and gave him a lenient cathartic. In the ſpace of two days more all his ſymptoms were exaſperated; his head-ach was great and conſtant, his fever high, he got no ſleep at all, the edges of the wounded ſcalp became foul, looſe, and ſpongy, and his forehead and viſage were attacked with an inflammatory ſwelling of the eryſipelatous kind. On the ſixteenth day he had a ſevere rigor, and was ſomewhat delirious, and his eyes became ſo tumified that he could not open them. In this ſtate I found him. Being informed of what I have here related, and having examined the bare cranium, I could not heſitate to ſay, that I apprehended his complaint proceeded from the formation and confinement of matter within the ſkull; and that the little chance the man had muſt be

from immediate perforation in the track of the fiſſure.

The operation was performed, and the dura mater found covered with matter. He was dreſſed lightly, and loſt twelve ounces of blood.

The next day I was informed that he was very rational but his fever unremitting, and that he got no ſleep. On the nineteenth day I ſaw him again, along with the late Mr. Bethune; the diſcharge from within the ſkull was large, and the bare bone and wounded ſcalp looked very ill; all his other ſymptoms much the ſame.

On the twenty-firſt I was ſent for again. He was now delirious in a high degree, paralytic in one arm and leg, and frequently convulſed in the other, the diſcharge was large and remarkably offenſive, his tongue black, the ſkin of his body burning hot and dry, that of his extremities cold and moiſt; and I ſuppoſe I need not tell the reader what happened that night.

CASE XVIII.

A Young man playing at cudgels in Moorfields received a ſtroke on his forehead; it did not ſeem either to himſelf or the ſpectators to have been a ſevere one, but as it produced blood it was deemed by the laws of the game a broken head, and he was obliged to yield to his antagoniſt.

As it gave him no trouble, he took no notice of it; was for ſeveral nights afterwards engaged in the ſame diverſion, and followed his daily labour. On the ninth day from that on which he received the blow, he thought that his forehead was ſomewhat ſwollen, and felt tender to the touch, on the eleventh it was more tumefied and more painful, and on the twelfth found himſelf ſo much out of order, that he applied to be received into St. Bartholomew's hoſpital.

An inciſion was made into the tumor; a thin brown ichor was diſcharged, and a bare bone being diſcovered, a circular piece of the ſcalp was removed, which diſcovered a fracture. The trephine was applied twice along the track of the fracture, by which

means it was almoſt totally removed. The dura mater was found diſcoloured, and beginning to have matter on its ſurface. The patient was let blood, and ordered to take the ſal abſinth. mixture with a few grains of rhubarb in it every ſix hours. The ſucceeding night was paſſed ill; the patient complained much of pain, and got little or no ſleep. On the fourteenth his fever was high, his ſkin hot, and his pulſe full and hard; fourteen ounces more of blood were taken from one of the jugulars; and as he ſtill continued coſtive, a lenient purge was given a few hours afterwards. On the ſeventeenth every thing bore a bad aſpect, both as to his wound and his general ſtate: he got no reſt, his fever was high, and the wound very ill-conditioned. His head was again carefully examined, in order if poſſible to diſcover ſome other injured part. No ſuch injury was found; and it being impoſſible that he ſhould remain in his preſent ſtate, evacuation ſeemed to be his only chance, and therefore fourteen ounces more of blood were drawn from one of the temporal arteries, by which he fainted, and after which he ſeemed to be ſomewhat eaſier.

For three days from this time he ſeemed to be conſiderably better; but on the twenty-firſt he was again in as much pain as ever, and the ſore again began to put on a bad aſpect.

The benefit which he had once already received from phlebotomy had been manifeſt; and as his pulſe was well able to bear it again, the temporal arteries were again opened, and he was bled till his pulſe failed ſo much and ſo ſuddenly that I was not a little alarmed. By proper care he was brought to himſelf, and I had no other trouble during his cure than what proceeded from his extreme weakneſs, which the bark ſoon removed.

Although this man may very juſtly be ſaid to have been ſaved by the frequent repetition of phlebotomy, yet as matter was beginning to be formed on the ſurface of the dura mater, and as ſuch matter could have no outlet whereby to eſcape, it is very clear, that unleſs the cranium had been perforated he muſt have periſhed.

CASE XIX.

THE driver of a poſt-chaiſe was thrown from his horſe near to Ware in Hertfordſhire, and ſtruck his head againſt what they call a ſtepping-ſtone in a waſh-way. He was ſtunned by the blow, and carried into a public houſe; but in half an hour's time found himſelf ſo well as to be able to carry the chaiſe to the place he was going to, which was juſt by. The next day, finding himſelf perfectly well, he went to work again, and continued to do ſo for ſix days. On the ſeventh, he found himſelf ſick, vomited twice, and had a kind of fainting fit followed by a great pain in his head, and ſome degree of fever. From the hardſhip and the irregular manner of theſe peoples' living, his complaints were ſuppoſed to be owing to cold, and to intemperance, and he was treated accordingly: but on the ninth day, a tumor appearing on that part of his head which had received the blow, a ſurgeon examined it, and upon opening the tumefied part found a fiſſure running diagonally acroſs the whole parietal bone. The next day he was brought to St.

Bartholomew's

Bartholomew's hoſpital. His ſkin was hot, his pulſe hard and quick, and he complained that his head felt as if it was ſqueezed between two trenchers. The whole fiſſure being brought into view, the trephine was applied three times along the track of it; from each perforation, a quantity of matter was diſcharged, and under each the dura mater was much altered. All poſſible care was taken of him, but to no purpoſe: every day produced an exaſperation of his ſymptoms. On the fourteenth he became paralytic on one ſide, and on the ſixteenth ſunk into a ſtate of perfect inſenſibility, and toward evening died. The whole internal ſurface of the left parietal and temporal bones was detached from the dura mater, and covered a large quantity of matter.

CASE XX.

A Bricklayer's labourer was knocked down by the fall of a large heavy pan-tile, which made a large wound in the ſcalp, and broke the ſkull. The fracture began in the left parietal bone, and traverſing the coronal ſuture ran about an inch in the os frontale.

He was ſoon brought to the hoſpital, where the ſcalp was immediately removed, ſo as to make way for the trephine; which inſtrument was applied on each ſide of the ſuture, in ſuch manner as to comprehend the fracture in each application of it.

The dura mater was found to be uninjured; there was neither extravaſation, nor any other mark of miſchief. The patient was freely and repeatedly let blood, kept to a proper regimen, and preſcribed for by the phyſician. In two months he was diſcharged perfectly well, and had not during his cure one ſingle bad ſymptom.

It may very reaſonably be remarked, that this was one of thoſe caſes which would have done well without the operation, which I am much inclined to believe: but

does

does not this caſe, as well as many others of like ſort, prove alſo, that the laying bare the uninjured dura mater is not a matter of ſuch hazard, as ſome have ſuppoſed it to be?

CASE XXI.

A GIRL about nine years old fell from the top of a pretty high hay-rick at Iſlington, and pitched with her head on the ground, which was hard and dry. She was carried home bleeding freely from a wound on one ſide of the upper part of the head, and a ſurgeon in the neighbourhood examining her found that her ſkull was broken; upon which ſhe was brought to the hoſpital. The fracture was detected; it began in one parietal bone, and paſſing the future ended in the other, making a courſe of about three inches in all. It was open, and blood diſcharged through it.

The trephine was applied to it on each bone, the dura mater was not hurt. She had neither ſickneſs, ſtupor, pain, nor fever, and got well without any trouble; not even having any exfoliation from the bare cranium.

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The ſame remarks as were applicable to the foregoing caſe are, perhaps, equally ſo to this.

CASE XXII.

A Farrier's ſervant received a blow from the foot of a horſe which he was ſhoeing. The blow knocked him down, and bereaved him of ſenſe. He lived near Smithfield, and was brought to the hoſpital ſenſeleſs.

I ſaw him in leſs than half an hour, and found him to all appearance well, his ſenſes perfectly recovered, and no remains of the injury viſible, ſave a ſmall bruiſe on his forehead. A diſcutient cerate was applied to the bruiſe, he was let blood, a purge was ordered for the next day, and he was adviſed to keep very quiet.

On the third day he was perfectly well, had no general complaint, and the bruiſe on his forehead was what is commonly called black and blue.

He continued well until the evening of the ſeventh day, in which he complained of being faint, chilly, and uneaſy in his head, particularly his forehead. The following night

night he was reſtleſs, and in the morning was ſick and giddy, and had no appetite. His pulſe was very little riſen; however twelve ounces of blood were taken from his arm, and he was ordered to take the ſal abſinth. mixture ſextis horis, and keep in bed. The ninth and tenth days were paſſed in much the ſame manner, but on the eleventh his fever roſe high, and the part of his forehead which had received the blow became ſwollen and tender. On the thirteenth the tumefied part palpably contained a fluid, and was therefore opened. A fracture of about two inches in length was diſcovered, running from juſt above the frontal ſinus upward. The trephine was applied in the moſt depending part, and matter found between the membrane and bone. The day after this operation, finding his pulſe to be full and hard, I bled him ſo freely that he ſwooned, and was ſome minutes before he recovered. That night he paſſed much eaſier; and although the diſcharge of matter was conſiderable for ſome time, yet, by proper care and due management, both phyſical and chirurgical, he got well.

I will not aſſert it to be a general fact, but as far as my own experience and obſervation

vation go, I think that I have ſeen more patients get well, whoſe injuries have been in or under the frontal bone, than any other bones of the cranium. If this ſhould be found to be generally true, may not the reaſon be worth enquiring into?

CASE XXIII.

A LAD about ſeventeen, the ſon of a plaſterer, was at work with his father at the manſion-houſe, and fell from a ſcaffold a conſiderable height. He lay ſenſeleſs for ſome minutes, but in a little time was ſo much recovered as to walk. On the left ſide of his head was a ſmall bruiſe, which gave him little or no pain. He had no ſymptoms which indicated that he had ſuſtained any miſchief; and after having ſtaid at home a day or two at the perſuaſion of his mother, he returned to his buſineſs. On the ninth day, from that of his fall, he was ſeized with a violent ſhooting pain in his head, was ſick, and had a kind of convulſive fit.

As it was not ſuppoſed that his fall had any ſhare in that attack, no notice was taken

of

of it; a few ounces of blood were drawn from his arm, and the apothecary who had the care of him gave him ſome of thoſe medicines that are called nervous.

His head-ach, fever, and watching, continued without remiſſion for ſeveral days, and at the end of three weeks he died, paralytic on one ſide, and convulſed on the other.

A ſmall ſwelling having appeared on his head three or four days before his death, his father deſired me to come and look at it, after that event had happened.

The pericranium was ſeparated from the left parietal bone quite acroſs, by means of a fracture which traverſed the length of the whole bone. A quantity of matter was lodged between the inner ſurface of the ſaid bone and the outer one of the dura mater, and a ſmaller collection of matter was alſo found between that membrane and the pia mater.

CASE

CASE XXIV.

A Young man about twenty-two was brought into St. Bartholomew's hoſpital, conſiderably hurt by a fall from a high ſcaffold.

The radius of his right arm was broken about its middle; the tibia and fibula of his left leg were both broken, and one or two of his ribs.

By proper care, in about five weeks, he was ſo well as to be permitted to get out of bed. The firſt day of his riſing he complained of being ſick and giddy, which was imputed to weakneſs and confinement, and therefore diſregarded. For three or four days after this period he complained of conſtant pain in his head, got no ſleep, and was conſtantly feveriſh. As he had never made any complaint of his head, nor had apparently ſuſtained any injury on that part, Mr. Nourſe (whoſe patient he was) could not ſuſpect any, and therefore contented himſelf with the common antiphlogiſtic regimen. At the end of the ſixth week, he complained that his head was painful to the touch; and the day after he had made this complaint, he

had

had a ſevere rigor, which laſted half an hour. On the twenty-ninth day a ſwelling, palpably containing a fluid, appeared on the ſide of his head. Mr. Nourſe opened it, and found a fracture of the parietal bone three inches long at leaſt, through which matter iſſued freely. The trephine was applied, a large quantity of matter was diſcharged, and the dura mater was found ſloughy; under which ſloughy part was another collection of matter between the membranes, and under this latter abſceſs the brain was conſiderably diſcoloured. He died on the fiftieth day from that of his fall.

CASE XXV.

A BOY, belonging to a horſe-dealer in Smithfield was thrown from a horſe, with great violence, againſt one of the ſheep-pens. He had a large wound and a fracture, which began about the middle of the frontal bone; and paſſing the coronal ſuture, ended in the right parietal.

A trephine was ſet on the fracture in the frontal bone, and a ſmall quantity of grumous blood diſcharged from between the

cranium

cranium and dura mater. All that day and night he continued ſenſeleſs; but the next day, by means of a ſecond plentiful bleeding, he recovered his ſenſes. To render every thing (as I hoped) ſecure, a ſmall trephine was applied on the other ſide of the ſuture, which ſeemed to comprehend all the breach made in the parietal bone.

For nine days from this time every thing looked well, and the boy was free from complaint; but on the twelfth from the accident, he complained of being much out of order; and the next day the ſore looked ill, and a thin gleet was diſcharged from the dura mater through the lint, which now ſtuck faſt to it, inſtead of coming off eaſily as uſual, and covered with good matter.

For three days from this time, both the boy and ſore remained in much the ſame ſtate. On the ſeventeenth, in dreſſing him, I obſerved a ſpongy kind of papilla on one part of the ſore, which was very tender to the touch, and from which was diſcharged upon preſſure, a thin ſanious kind of fluid; by means of a probe paſſed through this papilla, I diſcovered a ſinus with bare bone its whole length: the diviſion of this de-

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tected a capillary fiſſure, of at leaſt two inches in length. A trephine was ſet on it, and the dura mater was found diſcoloured, and with matter on its ſurface. By means of free evacuation at firſt, and as free uſe of the bark afterwards, this patient got well.

CASE XXVI.

TWO female inhabitants of St. Giles's got drunk together, and quarrelled; one of them threw a ſtool at the other, and knocked her down. The edge of the ſtool cut through the ſcalp, and broke the left parietal bone. The fracture ran from the middle of the bone as far as the ſagittal ſuture. The girl was dreſſed that night by ſomebody in her neighbourhood, and was brought the next morning to the hoſpital. As ſhe had no bad ſymptom of any kind, the operation was deferred, and ſhe went on very well for a week, at the end of which time ſhe began to complain in ſuch manner, and her ſore bore ſuch an aſpect, that I thought there muſt be miſchief under the cranium. A trephine was ſet on the fracture; the dura mater was found ſloughy and purulent. She was bled again freely,

and took proper medicines. On the fifteenth day ſhe had a ſhivering, and after it a very briſk fever. On the ſeventeenth ſhe was worſe in every reſpect. On the eighteenth a tumor appeared on the other ſide of the head. This was opened, and a fiſſure diſcovered in the right os parietale. A trephine was ſet on this fiſſure, and a diſcharge given to a large quantity of matter. Every thing that could be done for her was done; but on the twenty-third day ſhe died.

The dura mater was ſeparated from both the parietal bones, and matter found in large quantity under each.

It was for many years a generally received opinion, that one uſe of the ſutures of the cranium was, to prevent the paſſage of a fracture from one of the bones to another.

This purpoſe they may undoubtedly have often accidentally ſerved; but that they are generally incapable of ſo doing, manifold experience evinces. Fractures are often ſeen to paſs regularly through a ſuture, from one bone to the adjoining, without any diſcontinuation or impediment. This is a fact which ought, by writers and lecturers, to

be

be conſtantly inculcated, as an inattention to it may be of very bad conſequence to individuals: for the practitioner who ſuppoſes that a ſuture will certainly, or not unfrequently, ſet bounds to a fracture, will, when he has traced ſuch kind of breach in one bone as far as the ſuture into which it may happen to run, not think it at all neceſſary to go farther and examine the adjoining bone.

A ſuſpicion of the ſtricter adheſion of the dura mater to the ſkull at the places of theſe ſutures than every where elſe, the ſituation of what are called ſinuſes immediately under the ſutures, and a fear that either high and dangerous inflammation muſt follow the violent detachment of a part of them, or that an unreſtrainable and fatal hæmorrhage muſt enſue from a breach of thoſe veſſels which paſs from the ſinuſes through the ſutures, have deterred moſt of our anceſtors from meddling with them, and induced them to deliver down to us frequent prohibitions againſt the application of perforating inſtruments upon them. Neither of theſe apprehenſions are founded in fact, or in ſtrict truth. The ſeparation of the ſkull from the longitudinal ſinus is not attended neceſſarily with any kind or degree of inflammation peculiar to

itſelf, or more than any other part of the dura mater; nor is the laceration, or breach of the communicating veſſels between this ſinus and the ſuture which covers it, neceſſarily followed by any ſuch degree of hæmorrhage as to prove hazardous or alarming; as I have more than once experienced.

A perforating inſtrument moſt certainly ought not wantonly or unneceſſarily to be ſet on this part; and this for a reaſon not drawn from any peculiar hazard attending ſuch operation. The larger ſize, and greater number of veſſels here than in other parts of the bone, will certainly cauſe ſuch a degree of bleeding or hæmorrhage, as though eaſily reſtrainable when the piece of bone is removed, may yet, in the act of perforation, conſiderably embarraſs and perplex a young operator: it will therefore behove him, in general, to avoid comprehending the ſuture within his ſaw; but ſtill it is right that he ſhould know, that when particular circumſtances render it abſolutely neceſſary, ſuch thing may be done very conſiſtently with his patient's ſafety. Not only a part of the ſagittal ſuture, covering the longitudinal ſinus, may be removed with a trephine, if neceſſary, and no hazard be incurred from the

breach

breach of the attaching veſſels; but a wound of the ſinus itſelf is by no means *neceſſarily* attended with an unreſtrainable or fatal hæmorrhage.

The very writers themſelves, who are ſo apprehenſive of a wound of this part, forget the relations they every now and then give us of fragments of broken bone ſafely extracted from it.

A miſtake concerning the nature of the ſinuſes was (I ſuppoſe) the foundation of theſe apprehenſions. The idea which moſt of our anceſtors had of the motion of the dura mater induced them to believe that, as the ſinuſes were compoſed of this membrane, a wound made in them, like a wound in an arterial tube, could hardly reunite. It is now univerſally known, that they are merely venal, and that there is no ſuch impediment to the immediate coaleſcence of a wound in them, when it may happen to be accidentally inflicted.

CASE XXVII.

A BOY about eight years old, the ſon of a Jew merchant in the city, received a blow on his head with a ſtick from his tutor. The ſtroke made him giddy for a few minutes; but as no blood was ſhed, and the pain ſoon ceaſed, he concealed it till it was diſcovered by his barber that his head was ſwollen in that part. In the middle of the top of his head was a tumor, about the ſize of a common wall-nut; it was indolent, had a dull kind of pulſation, and palpably contained a fluid.

Mr. Serjeant Amyand and Mr. Shipton were joined with me. In their preſence I divided the tumor with a knife, and let out a quantity of fluid venal blood. When as much had been diſcharged as the tumor might be ſuppoſed to have contained, we were ſurprized to find the blood ſtill continue to flow, plainly not from the wounded ſcalp but from the bottom of the cavity.

Upon examination, it was found that the ſagittal ſuture was broken, that a portion of the fracture was forced into the ſinus,

and

and that the blood iſſued by the ſides of this fragment.

Extraction of this fragment was attempted, but to no purpoſe. By the direction of the conſultants, I made a ſmall perforation on one ſide of the ſuture; but when that was done, the point of the elevator could not be ſo introduced as to get the broken piece out. The trephine was then applied on the other ſide of the ſuture, and to the ſame effect, or rather no effect. The fragment was only capable of being extracted as it had gone in. At laſt, after much deliberation and converſation about the hazard of wounding a ſinus, (which was indeed already wounded by the broken bone) it was agreed to ſet a trephine on the ſuture, in ſuch manner that the whole ſurface ſhould be comprehended within its circle. This was done; but when the elevator was applied, the piece ſawed came out in fragments, and left the one portion which had pierced the ſinus ſtill ſticking in it. We were then neceſſitated to lay hold of it and extract it with a pair of forceps. A flux of blood followed, but by the application of a ſmall doſſil of dry lint, held on for a few minutes, it ceaſed,

and never recurred. The patient is alive at the time of my writing this.

CASE XXVIII.

A Girl about ſixteen was knocked down by her mother with an iron poker of conſiderable weight; the latter immediately ran away, and the former was brought ſenſeleſs to the hoſpital. She had a large wound on the top of her head, with conſiderable fracture of the ſagittal ſuture. The broken pieces were ſo large, and ſo looſe, as to be eaſily removable without any perforation. When they were taken away, the longitudinal ſinus was left bare, at leaſt two inches in length; but no hæmorrhage followed the removal of the fragments.

For three days ſhe was bled twice a day, from one part or other of her, and ſtools were procured in ſuch manner as was poſſible, but to no purpoſe; ſhe ſtill remained perfectly and abſolutely ſenſeleſs. On the fifth day, finding her ſtill in the ſame ſtate, and verily believing that nothing in art could at all ſerve her, I made an opening with a lancet into the longitudinal ſinus, and ſuf-

fered

fered the blood to run off, until her countenance, which was much flushed, became pale, and her pulse, which till now had been full and strong though labouring, faultered considerably; in short, till she shewed as much as a senseless person could the marks of a deliquium from inanition. I then put a bit of lint on the orifice, and ordered the nurse to keep her finger lightly on it until I had visited the rest of the house. When I returned, the part shewed no disposition to bleed again, nor did it ever after. That afternoon she opened her eyes and moved her arms, and the next morning was sensible enough to ask for drink. She retained her senses for several days, but a fever coming on she became delirious and convulsed, and died so on the seventeenth day from that of her admission into the hospital.

Upon examination, after death, a considerable abscess was found on the surface of the brain, on one side of the falciform process of the dura mater.

I should be very sorry to be so misunderstood, as to have it conceived that I have related these cases with a view to encourage the opening the longitudinal sinus; that is far from my intention; I only mean, by

adducing

adducing theſe inſtances, to prove that our fears of irremediable miſchief from ſuch wounds, whether accidentally or artificially inflicted, are not well grounded; and that we may, in ſome deſperate caſes, have recourſe to ſuch means as have been ſuppoſed to be either impracticable or unwarrantable. A ſurgeon ſhould ever be cautious, but ill-grounded apprehenſions will neceſſarily prevent improvements, and hinder us in ſome caſes from attempting what may prove beneficial to mankind. Had every ſucceſſor to Hippocrates been of his opinion, the operation of lithotomy had never arrived at its preſent ſtate of perfection, and mankind had been ſuffered to languiſh under, and be deſtroyed by, a moſt tedious as well as excruciating malady.

SECT.

SECT. V.

Fractures of the Cranium with Depreſſion.

SIMPLE fractures of the ſkull, or thoſe in which the parts of the broken bone are not depreſſed from their ſituation, differ from what are called fiſſures, only in the diſtance of the edges of the breach from each other. When the ſeparation is conſiderable it is called a fracture, when it is very fine and ſmall it is called a fiſſure. The chirurgical intention and requiſite treatment is the ſame in each, viz. to procure a diſcharge for any fluid which may be extravaſated in preſent, and to guard againſt the formation or confinement of matter in future. But in fractures attended with depreſſion the intentions are more. In theſe the depreſſed parts are to be elevated, and ſuch as are ſo ſeparated as to be incapable of re-union, or of being brought to lie properly and without preſſing on the brain, are to be totally removed.

Theſe circumſtances are peculiar to a depreſſed fracture; but although they are peculiar, they muſt not be conſidered as ſole,

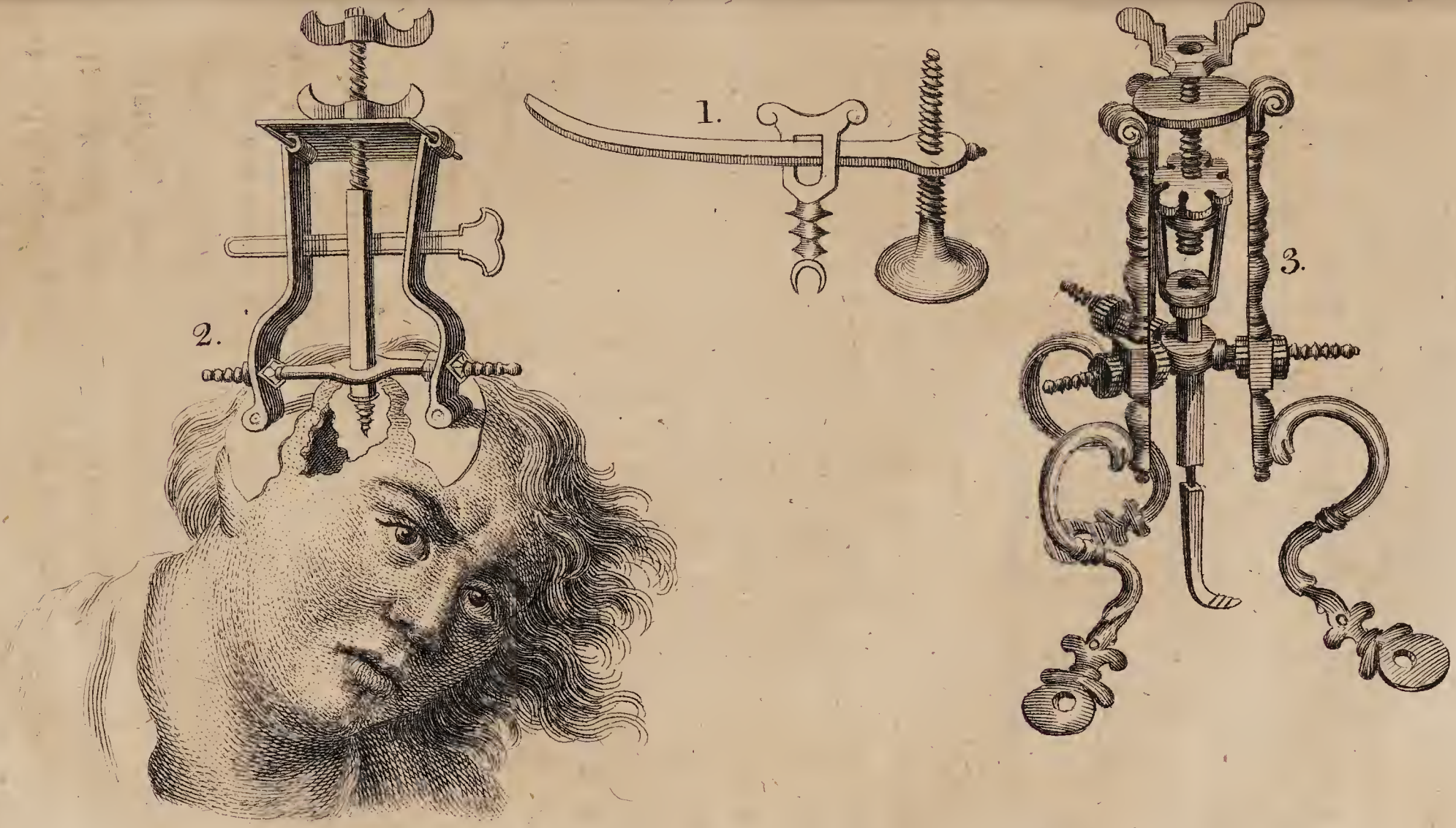
but

but as additional to all thoſe which have been mentioned at large under the head of ſimple fracture: commotion, extravaſation, inflammation, ſuppuration, and every ill which can attend on or be found in the latter, are to be met with in the former, and will require the ſame method of treatment.

To free the brain from preſſure, and to provide a free diſcharge for blood or lymph at preſent, or for matter in future, by elevating the depreſſed pieces, and by removing ſuch as were looſe, was as well known to the antients to be the proper curative intentions, as they can be to us; but the means which they made uſe of in order to accompliſh theſe ends were ſomewhat different to what are now uſed, and laboured under ſome inconveniences which later practitioners have corrected. This difference it may be worth while to inquire into.

Moſt of the attempts made by our anceſtors, for the elevation of depreſſed parts of the cranium, were made by the application of inſtruments to the parts ſo depreſſed. This was a palpable imperfection, to ſay no more of it; but this was not all; for the inſtruments which they made uſe of on theſe

occa-



I. *Elevatorium simplex.* 2. *Trochlea bipes.* 3. *Trochlea tripes, of the Antients.*

To front page 205.

occaſions were not only to be faſtened to the depreſſed part of the bone, but required alſo ſome degree of force to be uſed in faſtening them to ſuch part. The troclea tripes, the troclea bipes, and all the pieces of machinery deſigned by Albucaſis, Guido, Andreas a Cruce, Fabritius ab Aquapendente, Paré, and Scultetus, as well as thoſe delineated by Hildanus, and Peter Paaw, are proofs of this: they all require a perforation to be made in the depreſſed piece, either by or for the ſcrew with which it is to be elevated. Now, not to mention that moſt of theſe inſtruments were ſo complex as to render them extremely aukward and unmanageable, it is obvious, that by the application of any of them to the depreſſed pieces, (eſpecially if they were looſe) all the ills ariſing from preſſure made on the parts underneath muſt be increaſed; and that in many caſes they could not be uſed at all. Celſus has indeed directed the meningophylax to be uſed as an elevator; which inſtrument differs but little from the elevator uſed at preſent, either in form or manner of application; but then the opening through which it is to be introduced, is to be made either with the terebra or

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the cycliſcos, the inconveniences of which have already been remarked. In ſhort, all the objections which the old perforating inſtruments were liable to in ſimple undepreſſed fractures being of ſtill greater force in fractures with depreſſion, and the application of any kind of inſtrument whatever to the outer ſurface of a depreſſed or looſe piece of ſkull being palpably wrong, and liable to hazard, the preſent practitioners are certainly vindicable in having laid them all aſide, and in having endeavoured to accompliſh the ſame end by means which ars leſs hazardous and leſs operoſe. The trephine is (as I have before obſerved) the only perforating inſtrument uſed by the beſt of the preſent practitioners in England; with this, an opening is made in the ſound undepreſſed part of the cranium, and thro' ſuch opening an inſtrument called from its uſe an elevator is introduced. This perforation ſhould either comprehend the border of the fracture, where that is poſſible, or if that cannot conveniently be done, ſhould be made as near to it as poſſible, for reaſons too obvious to need recital. What number of perforations may be neceſſary can only be determined by the particular cir-

circumſtances of each individual caſe; all the intentions which may ariſe from extravaſation of fluid, or probability of ſuppuration, as well as thoſe from the depreſſion of bone, muſt be fulfilled, or the work will be left imperfect, and little chance of good will attend it.

When the whole diſeaſe ſeems to conſiſt in the mere depreſſion of the bone, and what ſymptoms attend ſeem to proceed from that alone; the elevation of ſuch portion may procure immediate remiſſion of ſuch ſymptoms, and afford a reaſonable proſpect of ſucceſs. But as the injury is not always of ſo ſimple a nature, as other parts are ſo frequently hurt and other miſchief done by ſuch great violence, the remiſſion, or diſappearance of ſuch ſymptoms as ariſe merely from ſuch preſſure, cannot be a ſufficient warrant, either for promiſing or for expecting ſucceſs. The dura mater under the depreſſed piece, or even in another part of the head, may have been ſo hurt as to become inflamed, and to ſuppurate, the ſymptoms of which will not appear immediately, nor in general until ſome time is paſt; but however late they may come on, they will not therefore be

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the leſs certain or the leſs hazardous. The early attack of thoſe which are cauſed by extravaſated fluid, or depreſſed bone, do by no means preclude the later acceſſion of ſuch as ariſe from inflammation and putrefaction. The depreſſed piece of bone does moſt certainly require our immediate help, but the aſſiſtance lent to that, however proper and effectual, does not render it at all leſs neceſſary to guard againſt ſuch ill as may moſt reaſonably be expected to proceed from violence ſuſtained by the parts underneath. A blow, which has been ſufficient to break and depreſs a portion of the ſkull, very frequently does ſuch damage to the tender veſſels which communicate between that bone and the meninges, as to be the cauſe of much more, as well as greater ill, than what is deducible from the mere fracture; and, conſequently, although the elevation of the bone is *one* very neceſſary part of the ſurgeon's buſineſs in theſe caſes, yet it is very far from being *all* that he has to do. All the ills which may be apprehended, from every other poſſible effect of ſuch violences, are to be feared and guarded againſt, and that full as much in the fracture with depreſſion, as in that without.

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This is a part of practice which ought to be very carefully attended to. The generality of writers have contented themſelves with directing us to raiſe up the depreſſed parts, and thereby to endeavour to remove ſuch ſymptoms as are cauſed by the mere preſſure which the bone makes on the brain; but have either totally neglected, or very ſlightly paſſed over, what is of full as much conſequence to the patient; I mean the injury which is moſt frequently done to the membranes of the brain, and which, if neglected, will certainly produce that fever, and thoſe ſymptoms, which ſo often baffle the whole power of medicine.

The combination of different ill effects, proceeding from the ſame primary violence, and concurring in the ſame ſubject, together with the great difficulty of diſtinguiſhing them from each other, is one of the principal cauſes of that perplexing uncertainty attending wounds of the head. When one cauſe of bad ſymptoms has been removed, another, or even ſeveral others, may ſtill remain, each of which ſingly may be ſufficient to deſtroy the patient; and therefore although the means firſt made uſe of may have been ſuch as have been

pointed out by the earlieſt and moſt alarming ſymptoms, and extremely proper for the relief of ſuch complaint, had it been the only one the patient laboured under; yet in the caſe of a complication, by not being ſufficient to anſwer every requiſite intention, they very often anſwer none; at leaſt not effectually; and producing only a temporary and partial relief, prove a greater aggravation of our diſappointment.

This every practitioner ſhould know, and this the friend of every patient ſhould be made acquainted with, leſt the former, being deceived by an appearance of amendment, be induced to promiſe what it will not be in his power to perform; and the latter, having had their hopes exalted, ſhould be the more ſeverely hurt by their diſappointment.

If the fracture be but ſmall, the depreſſion little, and the force with which it was produced not great, the elevator introduced through the perforation may be ſufficient to ſet it to rights, and, if there be no urgent ſymptoms, nor any miſchief done to the internal parts, may be ſufficient for all purpoſes. But if the force was great, if the ſymptoms are immediate and preſſing, if

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the fracture runs in a form inclined to a circular one, or if the depreſſed piece be cracked all round, the beſt and ſafeſt way is to remove the whole or greater part of the portion ſo depreſſed and circumſcribed.

To thoſe who are unuſed to things of this ſort, ſo large an opening as ſuch method of acting muſt make, will have a very tremendous appearance; and they may be inclined to ſuſpect much hazard and inconvenience from laying bare ſo large a portion of the dura mater: but let all ſuch remember, that however large the quantity of membrane may be which ſhall be thus denuded by the operation, yet the ſame quantity at leaſt, moſt probably a much larger, would, in all likelihood, become inflamed, and generate matter on its ſurface; which matter, for want of a timely, ready, and ſufficient outlet, would do conſiderably more miſchief, than the mere detection of the ſaid membrane can do.

In caſes where the broken pieces of a depreſſed fracture are widely ſeparated from each other, and ſome of them a good deal looſened, the expediency and the propriety of removing ſuch pieces is acknowledged by every body; but few people attend to the

reaſon, or inquire why ſuch practice is juſt and proper; if they did, they would alſo ſee that the free removal of bone was equally proper in the caſe of great violence, as in that of looſened or widely ſeparated pieces, In the latter, the broken parts are removed, becauſe their re-union with the reſt of the cranium, and the preſervation of the attachment of the dura mater to the inner ſurface of them, is thought impoſſible, or at leaſt highly improbable; and that therefore they muſt be in the way, and hinder the free diſcharge of matter from the ſuppurating membrane: and is not the ſame inconvenience full as likely to attend the former? Is it the violence done to the bone, and through it to the membrane, which cauſes the inflammation and ſuppuration? or is it the looſened or ſeparated ſtate of the broken part? If it be the former, (as it moſt undoubtedly muſt be) the ſame precautions, the ſame method of treatment, muſt be equally neceſſary in the one as in the other: the reaſons, the intentions are the ſame in each; and if the conduct be not the ſame, the patient will ſuffer.

The

The peculiar circumſtances of each individual caſe muſt furniſh direction to the practitioner for his particular conduct. Rules to be laid down by a writer on ſuch ſubject can be only general. The parts which are depreſſed muſt be elevated, ſuch as are looſe and cannot be brought to lie even, ſuch as cannot be prevented from preſſing on the membrane, or ſuch as wound or irritate it, muſt at all events be taken away; the free diſcharge of blood or lymph, in preſent, and of matter in future, muſt be provided for, and therefore every ſymptom and appearance muſt carefully and early be attended to, leſt the moſt proper opportunity of giving aſſiſtance be not embraced.

The circumſtances juſt mentioned are ſuch as cannot be neglected but at the riſque of the patient, and therefore the prohibitions which our forefathers have delivered down to us, with regard to the parts of the ſkull, on which they ſay we ought not at any rate to apply our perforating inſtruments, muſt be received with ſome limitation.

The places forbidden as improper are, the ſutures, the lower part of the os occipitale, the oſſa temporum, and that part of

the os frontale where the ſinuſes are ſituated.

That a trephine may without hazard be applied on a ſuture, I have already ſaid. When it may with equal utility be ſet on any other part, the ſutures ſhould undoubtedly be avoided, and that for a good reaſon, excluſive of any peculiar hazard: but that part of a ſuture may (the caſe requiring it) be ſafely removed, is true beyond all doubt. That many of the old practitioners were very apprehenſive of miſchief from hence, is not to be wondered at by any body who conſiders their idea of the nature of the ſubjacent ſinuſes, and the ſtrange unmanageable inſtruments with which they operated. Not that there are wanting old writers who have held the doctrine of operating on a ſuture, when neceſſary, very defenſible; among whom is J. Baptiſt. Corteſius.

Perforation of the temporal bones has been forbid, both on account of the artery and the muſcle which are on its ſurface; unreſtrainable hæmorrhage having been dreaded from the one, and fatal convulſion from the other; but experience may convince us, that neither of theſe apprehenſions are ſtrictly juſt. The temporal artery, when

divided,

divided, is often capable of being reſtrained by compreſſion, and always by ligature; and that fatal convulſion, which is vulgarly called the locked jaw, though it produces one of its moſt ſtriking and moſt viſible effects on theſe muſcles, is not neceſſarily produced by a wound of either of them, more than by a wound of any other. In ſhort, the upper part of the temporal bones may be laid bare, if neceſſary, by an inciſion made through the muſcles covering them; and may alſo be perforated. Such operation does not indeed often prove ſucceſsful; but the failure of ſucceſs does not proceed from the nature of the parts operated upon, but from a circumſtance of much more conſequence, and generally without remedy; which is, that in theſe fractures the breach is moſt commonly continued on to the baſis of the ſkull, and is alſo moſt frequently attended by a large extravaſation within or under the brain and cerebellum.*

* Whoever will examine the diſpoſition of the temporal muſcle will ſee, that its aponeuroſis covers a very conſiderable part of the inferior border of the os parietale;

When the depreſſed parts have been raiſed up, the looſe ones removed, extravaſated fluid diſcharged, the brain freed from preſſure, and way made for the free exit of whatever may be formed or collected, the bare dura mater ſhould be dreſſed as eaſily and lightly as poſſible. Our anceſtors had a multiplicity of medicaments, which they uſed upon theſe occaſions, and were very preciſe in ſuiting them to the different ſtates (as they called them) of the ſore and membrane. They were alſo very exact in making and applying thoſe pieces of linen or of ſilk, called ſindons, which they uſed to imbue with the ſaid remedies, and dreſs the bare dura mater with. I have taken no notice of either, becauſe I verily believe that the majority of the former were abſolutely uſeleſs, and that the very exact application of the latter was prejudicial, by confining, in ſome degree, what ought to be diſcharged with the utmoſt freedom.

Wounds of the brain, among writers on this ſubject, have alſo generally made a diſtinct

etale; and conſequently, that ſuch part of the bone can never be laid bare without a diviſion or removal of a part of the ſaid aponeurotic expanſion.

ſtinct chapter; but the treatment of them is ſo very little different from thoſe which have been already related, that they may fairly be comprehended under the ſame article.

The brain is wounded either by the inſtrument or body whereby the ſkull is broken, or by broken parts of the cranium; foreign bodies alſo, ſuch as bullets, ſplinters, parts of weapons, wadding of fire-arms, &c. are ſometimes lodged in it; but let the wound or fracture be what it may; or whatever other circumſtances may happen to attend, the chirurgic treatment is ſhort and plain, viz. to remove all ſuch parts of the broken ſkull, as may preſs, wound, or irritate the brain, or its membranes; to take away all ſuch extraneous bodies, as can eaſily, and without violence be got at and extracted; and to make ſuch an opening, as may moſt conveniently ſerve the purpoſe of diſcharging blood, ſerum or matter, either in preſent or in future. When all theſe things have been done, and the patient has been put under a proper regimen, both of diet and medicine, the ſurgeon has done his duty, and may ſay with Mr. Pope,

" Thus

" Thus far was right; the reſt we leave
" to heaven."

For with regard to the dreſſings proper in theſe caſes, they are not at all different from thoſe which ought to be uſed, where neither the brain nor its meninges are hurt. They ſhould be ſoft, light, and not conſiſt of any thing greaſy, or which can poſſibly irritate or inflame; nor ſhould they be applied in ſuch manner or quantity as to preſs or obſtruct the free diſcharge of fluids of any kind. Soft dry lint is perhaps equal to any or all others. In the chirurgical writers are to be found a great many formulæ, but whoever places confidence in them, for any ſuppoſed merit of their own, will find himſelf much diſappointed.

I cannot quit this ſubject, without making a ſhort remark on the bandages moſt frequently adviſed, and uſed in wounds of the head.

In all the writers on the ſubject of faſciæ, are to be found deſcriptions and delineations of thoſe which are ſaid to be moſt proper for the head. On paper they are neat

neat and elegant, in the application they require a ſmall degree of practice and dexterity, and when applied nicely may impoſe on the ignorant, and on thoſe who have not ſeen much of or reflected much on their inconvenience. They preſs, heat, and painfully confine the head, even when applied in the beſt and moſt ingenious manner; and when put on aukwardly or negligently are ſtill more troubleſome, and leſs ſerviceable. All that can ever poſſibly be wanted in theſe caſes from bandage muſt be, merely to keep the dreſſings in their place without any degree of confinement or preſſure; and this purpoſe will always be better accompliſhed by a looſe cotton or yarn night-cap, than by the niceſt and moſt elaborate bandage that ever was invented.*

CASE

* On this ſubject I was very glad to find ſo very good a judge as Oribaſius, of the ſame opinion.

" Hæc autem omnia non faſciis continentur, propter " pondus, ſed velamento, ut cohibeantur, neque cere- " bri membrana gravatur; ac velamenti media pars, " quæ terebrato reſpondet, forfice exciditur, ut aper- " tum fiat, atque in illud ſpatium lana mollis, in ex- " tremis conſtricta, duplex inditur, &c.

" Plerique

CASE XXIX.

A GIRL, about fifteen years old, croſſing Smithfield on a market day, was toſſed by an ox, and fell with her head on the flat ſtones within the poſts. As her dreſs was mean, and nobody knew any thing of her, ſhe was brought ſenſeleſs into the hoſpital. She had a large bruiſe on the right ſide of her head, through which I plainly felt a fracture with depreſſion. The ſcalp being removed from that part, the fracture was found to be large, and the depreſſion conſiderable; it traverſed the os parietale from before backward, in its middle part between the ſagittal and temporal ſutures, and the depreſſion was of the upper part of the bone. I applied a trephine on the inferior and undepreſſed part, and by means

" Plerique omnes non alia vinctura terebratos deli-
" gant; ſed ſola redimiculi circumductione contenti ſint.
" Quinetiam ipſa quoque ulcera extra terebrationem,
" quoad fieri poteſt, conari debemus ſine faſciis curare;
" non modo quia gravantur compreſſis iis quæ ſub vin-
" culis impoſita ipſis fuerant, verum etiam quia plus
" quam par eſt calefaciunt. Etenim quod in aliis par-
" tibus vinctura, id in capite poſitio præſtabit, ideo de-
" ligare ſupervacaneum erit."

ORIBASIUS de fract. ex Heliodoro.

means of an elevator raiſed the whole to a perfect equality. Her head was dreſſed lightly, and ſixteen ounces of blood were taken from her. She paſſed the following night very unquietly, and the next morning was ſtill ſenſeleſs. She was again freely bled, and a purge was given, which ſoon operated. On the third day her pulſe admitting, and her circumſtances requiring it, ſhe was bled again. On the fourth day ſhe became ſenſible, and on the fifth was ſurpriſingly well. She remained ſo until the ninth, on the evening of which ſhe complained of headach, ſickneſs and giddineſs. She was again let blood, and put under the direction of the phyſician, who ordered ſome medicines for her. From the ninth to the thirteenth day ſhe remained much the ſame, that is to ſay feveriſh, and complaining of heat, thirſt, head-ach, and watching. On the fourteenth ſhe had a ſevere rigor, and the ſore on the ſcalp as well as the denuded dura mater wore a very bad aſpect. From this time ſhe became daily worſe and worſe, in every reſpect; and on the twentieth day from that of the accident ſhe died, having been terribly ſhaken by ſpaſms for ſeveral hours.

All

All the internal ſurface of the os parietale above the fracture was detached from the dura mater, and covered with matter, which could not obtain free diſcharge at the perforation, the membrane being inflamed and thruſt up tight againſt it.

I will not pretend to aſſert, that repeated perforation of the upper part of the bone would have preſerved her; but I muſt ſay, as the caſe turned out, it would have been her beſt, if not her only chance; and that, if I had known at that time as much of theſe caſes as I think I have ſince learned, I ſhould certainly have taken away the greateſt part, if not the whole, of what had been depreſſed.

CASE

CASE XXX.

A Gentleman's ſervant riding careleſly and haſtily through London, was thrown from his horſe, and ſtruck his forehead againſt a ſharp ſtone. There was a conſiderable wound on the ſcalp, and a fracture, with depreſſion of the os frontale. The man was perfectly deprived of ſenſe, the bone was conſiderably depreſſed, and a large quantity of blood iſſued from underneath the depreſſed part. A trephine was applied on the undepreſſed part, and the elevation accompliſhed; he was let blood freely, and dreſſed lightly. On the ſecond and third days he was let blood again. On the fourth he recovered his ſenſes, and from that day to the ninth ſeemed to go on well. On the ninth in the evening he complained of pain and laſſitude, and was ill that night and all the next day. On the eleventh he was worſe, and (to uſe his own words) ſaid, his brains were bound round with a fillet like a collar of brawn. His pulſe was hard, frequent, and jarring, his ſkin hot, and he got no ſleep at all. As the man was evidently and haſtily getting into a hazardous

ſtate,

ſtate, I was determined to try what a free removal of bone would do; and with a large trephine took away almoſt the whole of what had been depreſſed. The dura mater was not purulent, but dull in colour, and ſmeared over with what Morgagni juſtly ſays, is gelatinis inſtar.

He was again and again let blood, as his pulſe would bear, and the phyſician ordered proper medicines for him. For four days from this time he continued much the ſame, but after that every thing changed for the better; he took the cortex freely, and in about three months was diſcharged well.

As I would not pretend to aſſert, that removal of more bone would have proved ſucceſsful in the preceding caſe, ſo neither will I ſay that the recovery of this man was owing to it. I can only ſay, I verily believe both, and that I am ſorry I did not make the ſame experiment in both. The caſes were materially ſimilar; and the analogical is the only method we have of reaſoning on ſubjects like this, wherein we cannot have demonſtration.

CASE

CASE XXXI.

A BOY about fourteen years old, following a led horſe, was deſired by the ſervant, in whoſe hand the horſe was, to ſtrike him; the boy did ſo, and received a blow from one of the horſe's heels, which brought him to the ground ſenſeleſs. He had on the upper and middle part of his forehead a large wound, which diſcloſed a conſiderable fracture, with depreſſion.

The fracture ran nearly in a tranſverſe direction acroſs the bone, and the depreſſion was of the upper part. A trephine was applied, an elevator introduced, and the depreſſed part of the bone with ſome difficulty made to lie even. The head was dreſſed lightly, and the boy was let blood largely. He continued ſenſeleſs all that night, was let blood twice the next day, and had a purge, and a glyſter. On the fourth day he ſhewed ſome ſigns of ſenſe, and in two more, being again let blood and kept very low, was quite ſenſible. From this day until the fourteenth, every circumſtance was promiſing, but on that day he again became ill; his pulſe from this time was hard and

quick, and, in ſhort, he had for three or four days all the ſymptoms of miſchief under the cranium. On the nineteenth I made a large perforation in that part of the bone which had been depreſſed and elevated, and gave diſcharge to a very large quantity of offenſive matter. On the twenty-ſecond he became delirious and convulſed, and on the twenty-third died.

I removed all the upper part of the cranium, and found the dura mater altered in colour, and ſeparated from the whole frontal bone, from the fracture quite up to the ſagittal ſuture; and under the ſaid membrane, matter to the quantity of about half an ounce.

CASE

CASE XXXII.

THE following caſe was ſent to me by a very ingenious practitioner at ſome diſtance from London, and may, among others of like ſort, ſerve to prove, that it is not the formation of matter between the ſkull and dura mater, but the confinement of it there, which is the cauſe of the bad ſymptoms, and of the hazard.

A boy fell from a cart loaded high with hay, and pitched perpendicularly on his head. The blow ſtunned him for a few minutes, but he ſoon got up again, ſaid he was not hurt, and walked home with the cart.

As he made no complaint at home, his maſter took no farther notice of his fall, and the boy followed his daily labour in the farm-yard.

At the end of a fortnight he came to my friend, and deſired him to look at the ſwelling on the upper part of the right ſide of his head. The tumor appeared to be full of matter, and the ſurgeon divided the ſcalp, and let out a conſiderable quantity. He paſſed his finger in, in order to examine

whether the cranium was bare or not, and was not a little aſtoniſhed to find it not only bare but conſiderably broken. He removed the tumid portion of the ſcalp; and having ſo done, found the diſtinct pieces of bone ſo looſe as to be taken away without any reſiſtance, and ſo large as together to make nearly a third part of the parietal bone. The dura mater under them was clean, and well incarned.

The boy had no one bad ſymptom from firſt to laſt, came to the ſurgeon's houſe every day to be dreſſed, and was alſo in the farm-yard daily.

SECT.

SECT. VI.

Extravaſation and Commotion.

GREAT and hazardous as the evils are which proceed from fractures of the ſkull, they do not exceed thoſe which are cauſed either by the extravaſation of fluids within its cavity, or by the concuſſion or derangement of the ſubſtance of the brain; whether we regard the difficulty under which a practitioner labours in forming a judgment of the true nature of the caſe, or the uncertainty, or the frequent fatality of the event.

The ſhock which the head ſometimes receives by falls from on high, or by ſtrokes from ponderous bodies, does not infrequently cauſe a breach in ſome of the veſſels, either of the brain or its meninges; and thereby occaſions extravaſation of the fluid, which ſhould circulate through them. This extravaſation may be the only complaint produced by the accident; or it may be joined with, or added to, a fracture of the ſkull. But this is not all, for it may be produced not only when the cranium is

unhurt by the blow, but even when no violence of any kind has been offered to or received by the head.

Vertigo, vomiting, ſtupidity, hæmorrhage, loſs of ſenſe and motion, either partial or total, are the ſymptoms of this kind of miſchief; ſometimes one, or more, ſometimes all, in the ſame ſubject. Theſe ſymptoms, which are all eaſily accountable for from extravaſation of fluid and unnatural preſſure made on the brain and nerves, are, as I have already at large remarked, frequently miſtaken as indications of a diſeaſe which, conſidered abſtractedly, can never cauſe them; I mean a ſimple undepreſſed fracture of the cranium: it may be accompanied by them, but cannot cauſe them.

When a fluid is extravaſated in any conſiderable quantity within the cavity of the cranium, if any bad ſymptoms are produced by it at all, they are, and muſt be, ſuch as indicate preſſure made on the brain, and origin of the nerves; occaſioning thereby either diſturbance or abolition of the offices of ſenſe and motion; and this in different degree, according to the quantity, kind, and ſituation of the preſſing fluid; and to theſe

are

are ſometimes added hæmorrhage from the noſe or ears. Thus far, I think, we may pronounce poſitively; but to our very frequent mortification we find, theſe are the only circumſtances which in ſuch caſes we can depend upon, every thing elſe which relates or belongs to them, being involved in a moſt perplexing obſcurity. We not only have no certain infallible rule whereby to diſtinguiſh what the preſſing fluid is or where it is ſituated, but we are in many inſtances abſolutely incapable of knowing whether the ſymptoms be occaſioned by any fluid at all; for a fragment of bone, broken off from the internal table of the cranium, and making an equal degree of preſſure, will produce exactly the ſame complaints.

Sometimes indeed the caſe is otherwiſe; and, from concomitant appearances, the true nature of the diſeaſe may with ſome degree of certainty be known; but this does not happen very often.

Many of our anceſtors, when no fracture was diſcoverable in the cranium of a perſon labouring under ſuch ſymptoms as have been mentioned, in conſequence of violence offered to the head, contented them-

ſelves with calling the caſe a concuſſion; and although they had no very preciſe idea annexed to the term, yet they ſeldom went farther for a ſolution: like teeth and worms in infants, or like nerves in women, it ſatisfied ignorant inquirers. The cranium was not broken, the miſchief was out of ſight, moſt probably out of reach, and they had not often the curioſity or the anatomical judgment to examine after death into the real ſtate of the caſe.

That a concuſſion or commotion of the ſubſtance of the brain is a circumſtance which frequently happens, is a truth beyond all doubt; and that it is often the cauſe of death, is as true; but that many of the caſes which, the ſkull being found not broken, have paſſed for concuſſions, have been really produced by very different cauſes, has often been inconteſtably proved by the examination of ſuch perſons' heads after death; where ſuch extravaſations of blood or lymph or both have been found, as would fairly and rationally account, both for the ſymptoms, and for the event.

A concuſſion and an extravaſation are very diſtinct cauſes of miſchief, though not always very diſtinguiſhable.

M. Le Dran, and others of the modern French writers, have made a very ſenſible and juſt diſtinction between that kind and degree of loſs of ſenſe which ariſes from a mere commotion of the brain, and that which is cauſed by a mere extravaſation, in thoſe inſtances in which the time of the attack or appearance of ſuch ſymptoms are different or diſtinct. The loſs of ſenſe, which immediately follows the violence, ſay they, is moſt probably owing to a commotion; but that which comes on after an interval of time has paſt, is moſt probably cauſed by extravaſation.

This diſtinction is certainly juſt and good, as far as it will go. That degree of abolition or diminution of ſenſe, which immediately attends or follows the blow or fall, and goes off again without the aſſiſtance of art, is in all probability occaſioned by the ſudden ſhake or temporary derangement of the contents of the head; and the ſame kind of ſymptoms recurring again ſome time after they had ceaſed, or not coming on until ſome time has paſſed from the re-

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ceipt of the violence, do moſt probably proceed from the breach of a veſſel within or upon the brain. But unluckily we have it not very often in our power to make this exact diſtinction. An extravaſation is often made ſo immediately, and ſo largely, at the inſtant of the accident, that all ſenſe and motion are inſtantaneouſly loſt, and never again return. And it alſo ſometimes happens, that although an extravaſation may poſſibly not have been made at the moment of the accident, and the firſt complaints may have been owing to commotion merely, yet a quantity of fluid having been ſhed from its proper veſſels very ſoon after the accident, and producing its proper ſymptoms, before thoſe cauſed by the commotion have had time to go off, the ſimilarity of the effects of each of theſe different cauſes is ſuch, as to deprive us of all power of diſtinguiſhing between the one and the other, or of determining with any tolerable preciſion to which of them ſuch ſymptoms as remain are really owing.

When an extravaſation of any kind is made, either upon or within the brain, if it be in ſuch quantity, or ſo ſituated as to diſorder the œconomy of the animal, it always

ways produces ſuch diſorder, by making an unnatural preſſure on the parts where it lies. The nature and degree of the ſymptoms hereby produced are various and different in different perſons, and under different circumſtances, according to the kind, quantity, and ſituation of the preſſing fluid. Sometimes it is mere fluid blood, ſometimes blood in a ſtate of coagulation, ſometimes it is a clear lymph, and at others blood and water are found mixed together; each of theſe is found either ſimple or mixed in different ſituations, that is, between the ſkull and dura mater, between the dura and pia mater, or in the natural cavities of the brain called its ventricles, and ſometimes, in caſes of great violence, they are found at the ſame time in all theſe different parts. Sometimes a conſiderable quantity is ſhed inſtantly, at the time of the accident; and ſometimes the breach by which the effuſion is made is ſo circumſtanced, both as to nature and ſituation, that it is at firſt very ſmall, and increaſes by faſter or ſlower degrees. In the former, the ſymptoms are generally immediate and urgent, and the extravaſation is of the bloody kind; in the latter, they are frequently ſlight at firſt, appear after ſome little interval of time,

increaſe gradually till they become urgent or fatal, and are in ſuch caſe generally occaſioned by extravaſated lymph. So that although the immediate appearance of bad ſymptoms does moſt certainly imply miſchief of ſome kind or other, yet, on the other hand, no man ought to ſuppoſe his patient free from hazard, either becauſe ſuch ſymptoms do not ſhew themſelves at firſt, or becauſe they appear to be but ſlight: they which come on late, or appearing ſlight at firſt increaſe gradually, being full as much to be dreaded as to conſequence as the more immediately alarming ones; with this material difference between them, that the one *may* be the conſequence of a mere concuſſion of the brain, and may by means of quietude and evacuation go quite off; whereas, the other being moſt frequently, owing to an extravaſation of lymph, (tho' ſometimes of blood alſo) within the ſubſtance of the brain, are very ſeldom removed by art.

Extravaſations of any kind, and wherever ſituated within the cranium, are very hazardous, and much more frequently end fatally than happily; but conſidered as relative to the art of ſurgery, that which conſiſts

ſiſts of merely fluid blood ſituated between the cranium and dura mater is certainly the beſt, as it is the neareſt to the ſurface, and admits the greateſt probability of being relieved by perforation of the ſkull; grumous or coagulated blood, although in the ſame ſituation, by being moſt frequently adhering to the membrane, is not ſo readily diſcharged as the preceding, and therefore more likely to prove deſtructive: and all thoſe which are either under the meninges, or within the cavities or ſubſtance of the brain, as they are very ſeldom within our exact knowledge, ſo they are alſo generally beyond the reach of our art.

The method of treating people under theſe unhappy circumſtances is ſomewhat different, according to the ſuppoſed or moſt probable nature of the complaint, and according to the ſymptoms and appearances which it produces or which accompany it. When the ſymptoms which imply a preſſure made on the brain or nerves have been occaſioned merely by a ſhake or concuſſion, and neither blow nor other external violence has been offered to or received by the head, we have no rule whereby to form any other than a general opinion; no mark which

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can point out to us, either the preciſe nature of the diſeaſe, or its particular ſituation; conſequently we have no direction from what part of the head to remove the ſcalp, or where to apply a perforating inſtrument, and therefore no authority for perforating at all. In this caſe, the only chance of relief is from phlebotomy and an open belly; by which we may hope ſo to leſſen the quantity of the circulating fluids as to aſſiſt nature in the diſſipitation or abſorption of what has been extravaſated. This is an effect which, altho' not highly improbable in itſelf, yet is not to be expected from a ſlight or trifling application of the means propoſed. The uſe of them muſt be proportioned to the hazard of the caſe. Blood muſt be drawn off freely and repeatedly, and from different veins, the belly muſt be kept conſtantly open, the body quiet, and the ſtricteſt regularity of general regimen muſt be rigidly obſerved. By theſe means, very alarming ſymptoms have now and then been removed, and people in ſeemingly very hazardous circumſtances have been recovered. Inſtances of theſe ſucceſſes are not indeed ſo frequent as we could wiſh, but they have been ſufficiently ſo to warrant the attempt, eſpecially in caſes where there are

no indications to authorize the uſe of any other. But when the ſymptoms of extravaſation are the conſequence of ſuch external violence as leaves a mark where it was inflicted, and when the ſcalp is ſo bruiſed or wounded as to ſhew the place where, we then have ſome degree of aſſiſtance, both in forming a judgment of the moſt probable nature of the complaint, and in uſing the means moſt likely to prove ſucceſsful in its relief. For if the effuſion has been the conſequence of the ſtroke which the head has received, and ſuch effuſion is made immediately under the part ſo ſtricken, the perforation of the cranium in this place may give diſcharge to the extravaſated fluid; and the wound or bruiſe in the ſcalp ſhews us the point from whence we ought to remove a portion of it, in order to perforate the cranium. This I ſay is ſometimes the caſe, and the conſequence is ſometimes ſo fortunate that we ſave a periſhing patient. But, although it does now and then happen that we are ſo lucky, yet ſuch ſucceſs is by no means certain or to be depended upon. Every thing relative to this kind of diſorder is fallible and uncertain; and though the extravaſation is

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ſometimes found immediately under the external mark, yet it often happens that it is not, and that the effuſion is made in a part diſtant from that mark, and to which we have nothing to lead us. Upon the whole, altho' a bruiſe or wound of the ſcalp does not in theſe caſes neceſſarily or certainly point out the ſeat of an extravaſation, yet when bad ſymptoms urge and evacuation has been fully and unſucceſsfully tried, ſuch mark may be deemed a ſufficient though not unerring authority for making farther enquiry, by removing the ſcalp and perforating the cranium: for this is a kind of caſe in which we are not to expect certainty, and in which we muſt be content with ſuch information as we can obtain. The opportunities which we have of being ſerviceable are but few; we ſhould therefore ſuffer none to eſcape, but embrace even poſſibility. The general advice given by Fabritius ab Aquapendente * is applicable to no part of ſurgery more than

* "In vulneribus quæ natura ſua admodum periculoſa ſunt, peſſimum eſt expectare prava ſymptomata; & tunc demum providere, cum forſitan occaſio præteriit, nec amplius providere licet."

FAB. ab AQUAPENDENTE.

than to this; in which the loſs of a very ſhort ſpace of time is abſolutely irretrievable.

If the extravaſation be of blood, and that blood be in a fluid ſtate, ſmall in quantity, and lying between the ſkull and dura mater, immediately under or near to the place perforated, it may happily be all diſcharged by ſuch perforation, and the patient's life may thereby be ſaved; of which many inſtances are producible. But if the event does not prove ſo fortunate, if the extravaſation be ſo large or ſo ſituated that the operation proves inſufficient, yet the ſymptoms having been urgent, general evacuation having been uſed ineffectually, and a wound or bruiſe of the ſcalp having pointed out the part which moſt probably received the blow; although the removal of that part of the ſcalp ſhould not detect any injury done to the bone, yet the ſymptoms ſtill ſubſiſting, I cannot help thinking, that perforation of the cranium is in theſe circumſtances ſo fully warranted, that the omiſſion of it may truly be called a neglect of having done that which might have proved ſerviceable, and, *rebus ſic ſtantibus*, can do no harm. It is very true, that no man can beforehand tell whether ſuch operation will prove beneficial or not,

becauſe he cannot know the preciſe nature, degree, or ſituation of the miſchief; but this uncertainty, properly conſidered, is ſo far from being a diſſuaſive from the attempt, that it is really a ſtrong incitement to make it; it being full as impoſſible to know that the extravaſated fluid does *not* lie between the ſkull and dura mater, and that under the part ſtricken, as that it *does*; and if the latter ſhould be the caſe, and the operation be not performed, one, and moſt probably the only means of relief, will have been omitted.

Morgagni, in his book de Cauſis et Sedibus, &c. has treated this ſubject expreſly, and has enumerated all the objections which may be made to the perforation of the cranium, in the caſe of effuſion of fluid within * it, but among others he has mentioned a popu-

* "Nam ut ſigna ſint, ex quibus liceat ſuſpicari ſanguinem intra calvariam eſſe effuſum, quis ſcire pro certo poſſit, an revera; et ſi hoc etiam ſciret, in quam partem effuſus ſit, & quod conſequitur, ubi os ſit perterebrandum, &c.

"Nam præter unum, qui majorem fortaſſe exterius dolorem moveat, alia eſſe poſſunt loca, ſub quibus majus revera lateat internum vitium.

"In

popular one, which prevails much among his countrymen, viz. the fear of having been thought to have deſtroyed thoſe, whom in the nature of things they could not ſave, " ne ſic occiſi, qui ſervari non potuerant, vi- " derentur." With all poſſible deference to ſo able a man, I muſt ſay, that this does not ſeem to me to be by any means a good reaſon, or one which ought to be formed into a maxim for practitioners: it is founded on the weakneſs and incapacity of thoſe who pretend to judge of what they do not underſtand, and therefore ſhould never be embraced through a ſelf-intereſted principle by thoſe who know better. If ſuch rule was uni-

" In cognoſcendo quam fallaces ſæpe ſint conjecturæ, " vel hinc apparet, quod & ſi pars ipſa icta, ab ægro in- " dicatur, imo ecchymoſi & tumore ſe ipſam præclare " indicet, non raro tamen caſus incidunt, in quibus alia " pars ſit contuſa, alia in quam effuſio facta ſit.

" Satis jam ſuperque intelligis caſus incidere, in quibus " aut nulla, aut tam levia, inter initia ſe offerunt, effuſi " intra cranium ſanguinis ſigna, tot autem, & tam gravia, " poſt longum intervallum confeſtim ſe ingerunt, ut ne- " que primo illo opportuno tempore æger ex timore pe- " riculi, ut terebram admittat, neque extremo ſperare " poſſent medici, opem ſe per eam allaturos, tam longo " ſpatio & tam perniciosis indiciis extantibus."

MORGAGNI de Cauſis & Sed. Morbor.

univerſally admitted, we ſhould often be prevented from employing a critical opportunity, or uſing what in many caſes is the unicum remedium, not only in this diſeaſe but in many others. The caſe of Ptolomey, cited by him from Livy, although brought as a ſtrong corroboration of his own opinion, really can prove nothing, unleſs it could be made to prove that terebration was the cauſe of, or at leaſt accelerated, the patient's death; which it can by no means be made to do. No man, who is at all acquainted with this ſubject, will ever venture to pronounce or promiſe ſucceſs from the uſe of the trephine, even in the moſt apparently ſlight caſes; he knows that honeſtly he cannot; it is enough that it has often been ſucceſsful where and when every other means have failed. The true and juſt conſideration is this; Does the operation of perforating the cranium in ſuch caſe add at all to that degree of hazard which the patient is in before it is performed? or can he in many inſtances do well without it? If it does add to the patient's hazard, that is certainly a very good reaſon for laying it aſide, or for uſing it very cautiouſly; but if it does not

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(which I verily believe,) and the only objection made to it is, that it frequently fails of being ſucceſsful, ſurely it cannot be right to diſuſe that which has often been not only ſalutary but the *cauſa ſine qua non* of preſervation, merely becauſe it is alſo often unſucceſsful, that is, becauſe it is not infallible.

I ſhould be extremely ſorry to ſay any thing which might miſlead my reader, but I cannot help thinking, that dark and obſcure as this part of ſurgery is, yet there are ſometimes appearances and circumſtances, which may be ſaid poſitively to indicate the operation; among which I reckon the ſpontaneous detachment of the pericraneum from the ſkull, in conſequence of a heavy blow, attended with ſymptoms of ſtupefaction or loſs of ſenſe.

Whenever the dura mater is ſeparated from its attachment to the inner ſurface of the cranium, the pericranium covering the outer part of the ſame bone is generally detached alſo. When this ſeparation is produced by the formation of matter, in conſequence of inflammation, the tumefaction of the ſcalp, which denotes this effect, appears ſome days after the violence has

been received, and is always accompanied with a ſymptomatic fever. The effuſion of a conſiderable quantity of extravaſated blood on the ſurface of the dura mater, as it abſolutely ſeparates that membrane from the bone, and cuts off all communication between that part and the ſcalp, ſo it does in the ſame manner oblige the pericranium to quit its detachment to the ſkull, of which I have remarked frequent inſtances; and I have alſo moſt frequently obſerved, that the blood in ſuch caſes has been coagulated, and very adherent to the membrane. Now if this obſervation ſhould be found to be moſt frequently true, that is, if a detachment of the dura mater from within the ſkull, by means of an extravaſation, be found to be moſt frequently accompanied by a detachment of the pericranium on the outſide, have we not thereby an indication both why and where we ought to perforate? The operation *may* not be ſucceſsful, but deſperation cannot be ſubmitted to while there is the moſt extreme degree of *probability* of being ſerviceable.

A free diſcharge by means of it may produce a cure, or it may prove only a tempo-

temporary relief, according to the different circumſtances of different caſes: the diſappearance or even the alleviation of the moſt preſſing ſymptoms is undoubtedly a favourable circumſtance, but is not to be depended upon as abſolutely portending a good event; either a bloody or limpid extravaſation may be formed or forming between the meninges, or upon or within the brain, and may prove as certainly pernicious in future as the more external effuſion would have done had it not been diſcharged; or the dura mater may have been ſo damaged by the violence of the blow as to inflame and ſuppurate, and thereby deſtroy the patient. The complaints ariſing from extravaſation, and from ſuppuration, are (as I have already at large obſerved) very different and diſtinct from each other; the former may be relieved, or even totally removed, and the latter not prevented, nor indeed be capable of prevention; of this every practitioner ſhould be aware, leſt he expect and promiſe too much.

The nearer the extravaſated fluid lies to the cranium the better; therefore that which is ſituated between the ſkull and dura mater is, cæteris paribus, the moſt favour-

able of any. If the diſeaſe lies between the dura and pia mater, mere perforation of the ſkull can do nothing; and therefore if the ſymptoms are preſſing, there is no remedy but diviſion of the outer of theſe membranes. The diviſion of the dura mater is an operation which I have ſeveral times ſeen done by others, and have often done myſelf; I have ſeen it, and have found it now and then ſucceſsful; and from thoſe inſtances of ſucceſs, am ſatisfied of the propriety and neceſſity of its being ſometimes done: but let not the practitioner, who has not had frequent opportunity of ſeeing theſe kinds of things, preſume, from the light manner in which this neceſſary operation has been ſpoken of by a few modern writers, that it is a thing of little conſequence; for it moſt certainly is not. Wounds of the membranes of the brain, by whatever body inflicted, or in whatever manner made, have always been deemed, and (which is more to the purpoſe) have always been found, to have been hazardous. There is indeed ſome difference between a wound made by a clean lancet or knife, and one made by bone, bullet, or any thing which bruiſes or tears; but this relates only to the

manner,

manner, the part wounded is the ſame in all; and whether the dura mater be divided by a lancet, or by a fragment of bone, or any other body, it is equally divided, and the air is let in, in the ſame manner, on the pia mater, or brain, which become thereby ſubject to all the ills which ſuch wound or ſuch expoſition are capable of cauſing.

Authors indeed do every now and then tell us ſtrange ſtories, and give us ſtrange accounts of inciſions made into the meninges and brain in ſearch of foreign bodies, of extravaſated fluids, &c. but let the young practitioner read theſe relations with ſome reſerve of faith, and recollect that the excellent advice given by a very able man, "homines non admiratione afficere, ſed eis "utiliora docere," is not always attended to. Caution and fear are different things; where any good can be done, it ought to be attempted by every practicable and juſtifiable means; but where no good is reaſonably to be expected, there is no authority for doing any thing. The diviſion of the dura mater I have ſeen to be neceſſary, and I have ſeen it to be ſucceſsful; but all wounds of it are far from being matters of indifference. Every chance of life is to be

embraced,

embraced, and a good ſurgeon will never heſitate to execute whatever appears feaſible, or even poſſibly beneficial; but at the ſame time he will not act without ſome ſuch kind of warranty as ſhall prove that his patient's benefit was his one object, and will take care his prognoſtic ſhall not expoſe him juſtly to the cenſure of being either ignorant, unfeeling, or fool-hardy.

Upon the removal of a piece of bone by means of the trephine, if the operation has been performed over the part where the diſeaſe is ſituated, and the extravaſation be of the fluid kind and between the cranium and dura mater, ſuch fluid, whether it be blood, water, or both, is immediately ſeen, and is partly diſcharged by ſuch opening; if, on the other hand, the extravaſation be of blood in a coagulated or grumous ſtate, it is either looſe, or in ſome degree adherent to the dura mater; if the former of theſe be the caſe, it is either totally or partially diſcharged at the time of or ſoon after the operation, according to the quantity or extent of the miſchief; if the latter, the perforation diſcovers, but does not immediately diſcharge it. In both inſtances, the conduct of the ſurgeon, with regard to repeti-

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tion of the operation, muſt be determined by the particular circumſtances of each individual caſe; a large extravaſation muſt neceſſarily require a more free removal of bone than a ſmall one; not only on account of freedom of diſcharge, but on account of a larger detachment of dura mater; and a grumous or coagulated extravaſation requires a ſtill more free uſe of the inſtrument, not only becauſe the blood in ſuch ſtate is diſcharged with difficulty, but becauſe the whole ſurface of the dura mater ſo covered is always put under the neceſſity of ſuppurating, which ſuppuration has but one chance of a happy event, and that derivable from the free uſe of the perforator.

When the extravaſation is not between the cranium and dura mater, but either between the meninges, or in the ventricles of the brain, the appearances are not only different from the preceding ſtate of the caſe, but from each other.

When the extravaſated fluid lies between the ſkull and dura mater, as ſoon as that extravaſation is diſcharged, or the grumous blood has been wiped off, the dura mater appears flaccid, eaſily yields to or does not

reſiſt

reſiſt the impreſſion of a finger, and (the diſcharge being made) enjoys that kind of motion, that elevation and depreſſion, which our fathers ſuppoſed it to have naturally and always, but which is only the conſequence of the circulation through the brain, and the artificial removal of the piece of bone. But when the extravaſation is ſituated between the meninges, or on the ſurface of the brain, the appearance is not the ſame. In this caſe there is no diſcharge upon removing the bone, and the dura mater, inſtead of being flaccid and readily obeying the motion of the blood, appears full and turgid, has little or no motion, and preſſing hard againſt the edges of the perforation, riſes into a kind of ſpheroidal form in the hole of the perforated bone. If the extravaſation be of the limpid kind, the membrane retains its natural colour; but if it be either purely fluid blood, or blood coagulated, and the ſubject young, the colour of the membrane is ſo altered by what lies under it, that the nature of the caſe is always determinable from this circumſtance.

Be the extravaſated fluid what it may, it has no natural outlet; abſorption was the only chance the patient had whereby to get

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rid of it without an operation, and that we muſt now ſuppoſe to have failed; an artificial opening therefore muſt be made, by the diviſion of the dura mater, and perhaps of the pia alſo. This operation, under the circumſtances and appearances already mentioned, is abſolutely neceſſary, and has been ſucceſsful; it is performed to give diſcharge to what cannot be got rid of by any other means, and conſiſts in a diviſion of the membrane or membranes, made in a crucial form with the point of a lancet. The operation in itſelf is extremely ſimple and eaſy, but the patient is thereby put into the ſtate of one whoſe meninges have been wounded, with only this difference, that the wound made for this purpoſe is ſmooth and ſimple, and inflicted with the leaſt poſſible violence; whereas an accidental wound of the ſame parts may be lacerated, contuſed, and attended with circumſtances which muſt aggravate the evil, and may induce worſe conſequences.

Of commotion or concuſſion of the ſolid parts of the brain, we have only a negative kind of proof, and therefore are ſtill more

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in the dark, than we are with regard to extravaſation.

Very alarming ſymptoms, followed ſometimes by the moſt fatal conſequences, are found to attend great violences offered to the head; and upon the ſtricteſt examination both of the living and the dead, neither fiſſure, fracture, nor extravaſation of any kind can be diſcovered. The ſame ſymptoms, and the ſame event, are met with when the head has received no injury at all ab externo, but has only been violently ſhaken; nay, when only the body or general frame has ſeemed to have ſuſtained the whole violence. It is a commonly received opinion, that a concuſſion of the brain is always in proportion to the reſiſtance which the cranium makes; that if the latter ſuſtains a conſiderable degree of fracture, the former is but ſlightly injured, and that the concuſſion of its contents is great in proportion. This may ſometimes be the caſe; violent and even fatal commotions of the brain happen when no injury has been done to the ſkull, and very large and terrible fractures are ſometimes unattended with any ſymptoms of concuſſion; all this is ſometimes true, but the poſition can by

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no means be admitted as a general principle, whereon to form our judgment, or whereby to regulate our conduct, experience frequently contradicting it.

The ſymptoms attending a concuſſion are generally in proportion to the degree of violence which the brain itſelf has ſuſtained, and which indeed is cognizable only by the ſymptoms. If the concuſſion be very great, all ſenſe and power of motion are immediately aboliſhed, and death follows ſoon: but between this degree and that ſlight confuſion (or ſtunning, as it is called) which attends moſt violences done to the head, there are many ſtages. Sometimes a concuſſion produces the ſame kind of oppreſſive ſymptoms as an extravaſation, and the patient is either almoſt or totally bereft of ſenſe: at other times no ſuch ſymptoms attend, but the patient gets no ſleep at all, has a wild look, an eye much like to that of a perſon who has long watched through apprehenſion and anxiety, talks much and very inconſiſtently, has a hard labouring pulſe, ſome ſmall degree of fever, and ſometimes an inclination to vomit; if not retained, the patient will get out of bed, and act with a kind of frantic abſurdity, and

appears

appears in general much hurt by a ſtrong light. A debility of underſtanding, an idiot look, a failure of memory, a paralytic affection of ſome one part or limb, the loſs of ſenſe, ſpaſm, reſolution or rigidity of ſome one part or muſcle, are often the conſequence of it. Theſe complaints are ſometimes cured, but ſome of them do ſometimes remain through the reſt of life.

To diſtinguiſh between an extravaſation and a commotion by the ſymptoms only is frequently a very difficult matter, ſometimes an impoſſible one. The ſimilarity of the effects in ſome caſes, and the very ſmall ſpace of time which may intervene between the going off of the one and acceſſion of the other, render this a very nice exerciſe of the judgment. The firſt ſtunning or deprivation of ſenſe, whether total or partial, may be from either, and no man can tell from which; but when theſe firſt ſymptoms have been removed, or have ſpontaneouſly diſappeared, if ſuch patient is again oppreſſed with drowſineſs, or ſtupidity, or total or partial loſs of ſenſe, it then becomes moſt probable that the firſt complaints were from commotion, and that the latter are from extravaſation; and the greater

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the diſtance of time between the two, the greater is the probability not only that an extravaſation is the cauſe, but that the extravaſation is of the limped kind, made gradatim, and within the brain.

Whoever ſeriouſly reflects on the nature of theſe two cauſes of evil within the cranium, and conſiders them as liable to frequent combination in the ſame ſubject, and at the ſame time conſiders, that in many inſtances no degree of information can be obtained from the only perſon capable of giving it (the patient), will immediately be ſenſible, how very difficult a part a practitioner has to act in many of theſe caſes, and how very unjuſt it muſt be to call that ignorance, which is only a juſt diffidence ariſing from the obſcurity of the ſubject, and the impoſſibility of attaining materials to form a clear judgment.

When there is no reaſon to apprehend any other injury, and commotion ſeems to be the ſole diſeaſe, plentiful evacuation by phlebotomy and lenient cathartics, a dark room, the moſt perfect quietude, and a very low regimen, are the only means in our power; and are ſometimes ſucceſsful.

Having in the preceding ſheets frequently ſpoken of the trephine, I have only to add, that if ſuch operation be attended with ſucceſs, that is, if an extravaſated fluid be thereby diſcharged, a depreſſed bone elevated, matter which had been formed between the ſkull and dura mater let out, or the inflammatory tenſion of the membrane prevented, in ſuch a manner as to reſcue the patient from the danger he was in from ſuch accident; in ſuch caſes, I ſay, that the bare dura mater readily obeys the motion of the blood thro' the brain, and freely elevated and depreſſed; by degrees it loſes its bright ſilver hue and becomes purulent and ſloughy, and then caſting off this ſlough is covered by a granulation of new fleſh, of firm conſiſtence and florid red colour; a moderate quantity of good matter is diſcharged daily, and the new incarnation riſes gradually through the perforation, until it gets above the edges of it, when joining with that which either has ſprung from the ſurface of the bare cranium, or which has thrown off from thence a ſmall exfoliation, they together make a firm cicatrix. During all this time the patient is generally free from fever or pain, gets good ſleep, has a natural appetite, and ſeems as

near

near to being in health as his circumſtances can permit.

On the other hand, if the miſchief be ſuch that all means prove ineffectual, the appearances are very different. The dura mater, inſtead of caſting off a thin ſlough and incarning kindly, becomes hard, tenſe, and foul; in a few days it generally thruſts up an ill-natured fungus, which preſſing hard againſt the edges of the perforation, prevents the diſcharge from within; the bare bone becomes blackiſh or deeply yellow, and the edges of the ſore in the ſcalp are painful, looſe, flabby, and have no connection with the bone on which they lie; the diſcharge is a thin ſtinking gleet, and large in quantity; the patient is hot, thirſty and ſleepleſs; the tongue is black, the pulſe hard and quick; ſometimes a delirium, and ſometimes frequent ſpaſms diſorder and ſhake his whole frame; his countenance is fluſhed and has a yellow tint, his eyes loſe all their natural brightneſs and ſeem ſunk in their orbits, and his rigours, which were at firſt ſlight and few, become more frequent and more ſevere as his diſſolution approaches. A ſlight degree of theſe ſymptoms is ſometimes got the better of by pro-

per care and treatment; but if they are far advanced, or run very high, we may uſe the words of a very excellent writer on this ſubject, I mean Berengarius Carpenſis:* *Hic caſus eſt de his, e quibus non evadunt aliqui, niſi mihi dei.*

CASE

* The ſentiments of a very ancient writer on this matter are ſo very juſt and appoſite, that I hope the reader will excuſe the length of the quotation.

" Qui ſaneſcere poſſunt, vel perituri ſunt, ex his con-
" jicere eſt; plurimum quidem ex ipſo vulnere, deinde
" & ex reliquo corpore.

" Salubriter ſe habentium notæ ſunt, ulcus non dolens,
" cerebrique membrana naturalem colorem, ac motum
" ſervans, & ulcus poſt ſuppurationem imminui. Pus al-
" bum, æquale, modice craſſum, non maleolens. Ulcus
" quod initio album apparuit, poſt aliquod tempus rube-
" ſcere, carnem milio ſimilem producere, ſquamulaſque
" ſuis temporibus emittere; ſine perturbatione ſomnum
" capere; ſine febre eſſe, cibum appetere; aſſumpta di-
" gerere; æquas excretiones fieri; glandulas, quæ primis
" diebus apparuerant, aut eryſipelas cito diſſolvi.

" Eos, qui periclitantur, cognoſcere licet tum aſpectu,
" tum ex iis quæ vulneri cæteroque corpori accidunt, &
" iis quæ excernuntur. Color igitur plerumque langui-
" dus & permanens, periculoſus, oculique concavi & ex-
" tantes, &c. Ulcus dolere, magis interdiu, retorridum
" fieri, atque omni plerumque tumore carere, vel ſaniem
" manare tenuem, ac male olentem; oraſque ſectæ carnis
" admodum rubras & flaccidas eſſe, atque ubi magis re-
" flexæ ſint, tunc abſcedere cutem ab oſſe moleſtum eſt,
" membranamque vulneratam immobilem eſſe, exaſbidam

" vel

CASE XXXIII.

A Young fellow about twenty-four years old was thrown by the ſwing of a crane at the water-ſide from a window two ſtories high, and pitched his head on a ſugar hogſhead. He was taken up ſenſeleſs, and brought in that ſtate to St. Bartholomew's hoſpital.

He was immediately let blood freely, and his head being firſt clean ſhaved was very carefully examined, but no external mark of violence was found. Next morning he was bled again, and the ſame operation was repeated in the evening of that day, and twice in the courſe of the third. On the fourth day both the temporal arteries were opened,

" vel lividam apparere, vel nigram, vel plurimum inflam-
" matam aut procidentem, purgatamque, iterum ſponte
" non ob aliqua re externa ſordeſcere."

ORIBASIUS de Signis.

" Spem vero certam faciunt, membrana mobilis ac ſui
" coloris, caro increſcens rubicunda, facilis motus max-
" illæ, atque cervicis.

" Mala ſigna ſunt membrana immobilis, nigra vel li-
" vida, vel aliter coloris corrupti, dementia, acris vomitus,
" nervorum diſtenſio vel reſolutio.—Caro livida, maxil-
" larum atque cervicis rigor." CELSUS.

opened, and bled freely. On the fifth day he died, his ſymptoms not having remitted in the ſmalleſt degree. The cranium was perfectly uninjured. The dura mater every where adherent, and no fluid of any kind between it and the ſkull. Between the dura and pia mater was a conſiderable quantity of fluid blood, and principally toward the lower part of the brain.

CASE XXXIV.

A Hackney coachman was thrown from his box in Holborn, and fell on his head, as it was thought. He became immediately inſenſible, and was brought ſo to the hoſpital. No mark of violence was to be found on any part of his head, and therefore, although his ſymptoms were ſuch as rendered an extravaſation moſt probable, yet there was no authority for ſetting on the inſtrument on any particular part. Every thing was done for him both by the phyſician and myſelf, from which any advantage might reaſonably be expected; but on the third day he expired, having never ſhewed and ſigns of ſenſe.

All

All the ſpace between the frontal bone and the dura mater was covered with grumous blood, firmly adherent to the latter.

CASE XXXV.

A Bricklayer's labourer fell from a high ſcaffold, broke one arm and one thigh, and was brought to the hoſpital about two hours afterward in a ſtate of ſtupidity. When his arm and thigh were put to rights his head was examined, but no mark of miſchief diſcovered. He was bled freely, and ſtools procured on each day for four, but he continued in the ſame ſtate; on the fifth a ſmall tumor aroſe on the right ſide of his head. The ſcalp was removed, and the bone being found bare, it was immediately perforated. The perforation made way for a large diſcharge of blood, which had been contained between the dura mater and ſkull. On the firſt and ſecond day from this operation he remained the ſame; blood was drawn from ſome part of him on each, and the diſcharge continued large and free through the opening made in the bone. On the third day from the application of the trephine, he became toward evening ſome-

what ſenſible. On the fourth, having taken a laxative medicine, he had a ſmart purging which laſted ſome hours. On the ſixth he was quite calm and ſenſible, but being reduced to a very low ſtate by his free and frequent evacuations, it was thought right to give him the cortex. This agreed well with him, and from this time he had no other difficulty or trouble.

CASE XXXVI.

A Boy about ten years old, climbing up a ladder which was ſet too perpendicularly, fell from an height of more than twenty feet; he lay ſome time before he was found, and then was carried home perfectly void of ſenſe. In about three hours after the accident I ſaw him. He lay quite ſtupid and ſenſeleſs, now and then vomited, had a hard, full, labouring pulſe, and an obſtructed reſpiration. No mark of violence appeared on his head. He was bled freely, and had a ſtimulating glyſter, which procured a free diſcharge. During three days he was let blood twice a day; on the fourth, a ſmall degree of tumefaction appeared on the right ſide of his head near to the ſagit-

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tal ſuture; it was not very manifeſt, neither did it appear to contain any conſiderable quantity of fluid; but the very deſperate circumſtances the child was in, induced me to open it, and, finding the ſkull bare, to perforate. The dura mater was covered with blood, which diſcharged freely, both at the time of the operation, and during all the next day. On the third day from the operation he was ſtill inſenſible. A ſecond perforation was made juſt below the firſt, and a third on the other ſide of the ſuture. Blood was diſcharged freely from all three. He was dreſſed lightly, and his pulſe being ſtill ſtrong, more blood was drawn from one of the jugulars. The next day he was rather better, but far from ſenſible. The day following that, he recovered his underſtanding, and could make ſigns for what he wanted. It was near a week more before he got his ſpeech, but in the end he got perfectly well.

CASE

CASE XXXVII.

A Boy between three and four years old, the ſon of a merchant in my neighbourhood, was at play with his brother on a bed, and fell from thence on a ſoft bedſide carpet. He pitched on his head, and complained immediately of being ſick and giddy, but having vomited, was ſoon after ſo well that no farther notice was taken of his fall. On the fourth day from this, his ſickneſs and giddineſs returned. Dr. Lee was ſent for, who not regarding the fall as having any ſhare in his complaint, gave him an emetic, and ordered him ſome of thoſe medicines which are called nervous. For the ſpace of five days from this time, he continued to be now and then ſick and giddy, and was very unwilling to ſtir or be ſtirred. On the eleventh he complained that he could not ſee, and that evening had a ſort of fit. On the thirteenth his right arm became uſeleſs. On the fifteenth he could not ſtand. From this evening he became ſtupid; on the eighteenth expired.

Between the dura and pia mater was a conſiderable quantity of bloody ſerum about the baſis of the brain.

CASE

CASE XXXVIII.

A Woman came to my houſe, complaining that her huſband had kicked her down ſtairs, and had broke her ſkull. On the back part of her head was a ſmall wound, but the pericranium was not divided, nor was there any reaſon to ſuppoſe the bone to be hurt. For twelve days ſhe remained without any general complaint; but on the thirteenth ſhe began to be giddy and dim-ſighted.

I took her into the hoſpital, where ſhe was taken all poſſible care of; but ſhe became firſt paralytic, and then comatoſe, and ſo died. The ventricles of the brain were full of extravaſated ſerum, and near the origin of the medulla oblongata was a large lump of firmly coagulated blood.

CASE XXXIX.

A Carpenter's labourer in Blackfryers fell from a ſcaffold of a conſiderable heighth, and in his way down, ſtruck a piece of timber, which following him hit him on the head. The man fell on his breech. He was brought to the hoſpital ſenſeleſs. The mark on his head made by the timber was ſcarcely viſible, and did not imply any miſchief underneath. He was freely let blood, and his body emptied by a glyſter adminiſtered that day. The next day more blood was drawn from one jugular, and the third the ſame operation repeated. On the fourth he ſpake, and on the fifth was ſo ſenſible as to give an account of the place from whence he fell. On the ſixth, ſeventh, eighth, ninth, tenth, and eleventh, he was free from complaint, except on the two laſt he was too much inclined to doſe. On the twelfth he found ſome difficulty in pronunciation, and ſaid, that it was with great difficulty that he could keep himſelf awake. As his pulſe would very well bear it, more blood was drawn away by opening

opening the temporal artery, and a bliſter was applied to his neck. On the fifteenth he could hardly ſpeak at all, and was never awake unleſs diſturbed for that purpoſe. On the eighteenth he loſt the uſe of his left ſide, and on the twentieth died.

About the lower part of the brain was found a ſmall quantity of bloody ſerum, and all the ventricles were filled with a clear lymph.

CASE XL.

A Boy about fifteen was thrown over the head of a horſe, who fell down with him in Smithfield. There was on the ſide of his head a large wound with a bare parietal bone; and although there was no appearance of fracture, yet the violence having been great, and the boy being perfectly ſtupid, I immediately perforated the bare bone, ſuſpecting an extravaſation on the dura mater. That membrane was perfectly fair and adherent, nor was there any appearance of extravaſation either upon or under it. The next day he was ſtill inſenſible. I examined the membrane again very carefully,

fully, in order to ſee whether there was any authority for dividing it, but could find none. Blood was drawn from different parts in large quantity, but to no purpoſe; he lived three days as it were in a deep ſleep, and then died. There was no injury done to the ſkull; no extravaſation of either blood or ſerum, either upon or between the membranes, nor any unnatural appearances in the cavities of the brain. But upon the plexus choroides was a lump of coagulated blood, near as big as half a ſmall cheſnut.

In the courſe of theſe papers, I have more than once ſaid, that although the ſymptoms ariſing from preſſure made on the brain and nerves, or on the meninges, were uniform and clear and perfectly diſtinct from thoſe cauſed by inflammation, yet that they very ſeldom indicate what kind of body ſuch preſſure was made by; whether blood, water, or bone; and conſequently, that altho' the diſorders proceeding from preſſure were perfectly diſtinguiſhable from thoſe cauſed by inflammation, yet they were not at all or very ſeldom ſo with regard to each other. Some of the immediately preceding caſes

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are proofs, with regard to blood and lymph, and what follow will I think in ſome degree prove that the ſymptoms are the ſame, when they are cauſed by bone, or by blood and bone together.

CASE XLI.

A Child about nine years old received a blow from a cricket-bat on the upper part of his forehead, which brought him to the ground, and deprived him of ſenſe. I found him with a conſiderable tumor on his forehead, and conſidering the ſtate he was in, would have removed immediately a part of the ſcalp; but a dabbler in ſurgery, who was a relation, undertook to cure him by an application. On the third day I was ſent for again, and found him nearly in the ſame ſtate as I left him. I divided the ſcalp, and found a fracture with depreſſion. By means of the trephine and elevator the depreſſed part was raiſed, and the dura mater being found in a very good ſtate, and no apparent extravaſation in the caſe, nothing more was done at that time. Proper medicines were ordered to procure ſtools. The next day his ſymptoms were the ſame, except that his pulſe

pulſe was leſs labouring, and he had not the apoplectic ſtertor, which he had till then. I examined the bone, which lay perfectly ſmooth, nor was the dura mater at all elevated into the perforation. Blood was freely drawn from the temporal arteries, and a ſtimulating glyſter adminiſtered. On the fifth day no alteration. I applied a trephine in the middle of that part of the bone which had been depreſſed and elevated. The dura mater was thinly covered with grumous blood, which being gently wiped away more of the ſame appeared; for two or three days this diſcharge continued in ſmall quantity; the boy gradually recovered his ſenſes, and in due time got well.

CASE

CASE XLII.

A Young woman was thrown out from a country waggon, upon a broad flat pavement, and ſaid to have pitched upon her head. She was inſtantly deprived of ſenſe, and brought to the hoſpital in that ſtate. Her head was immediately ſhaved, and examined, but found to be ſo abſolutely free from all mark of violence, that I was in doubt of the truth of the account given of her. She was freely let blood, and ſome medicines directed to be got down, in order to empty her. The next day ſhe was in the ſame ſtate. More blood was drawn off, and her cathartic repeated. The third day, ſhe being exactly the ſame, both the temporal arteries were opened. On the fourth, there being no alteration, I determined to apply a trephine on that part of her head, on which ſhe was ſaid to have fallen, and which when preſſed hard, ſeemed to produce ſuch motion in her as if it gave ſome pain.

In a caſe of leſs neceſſity this would hardly have been an authority, but here ſomething was to be attempted. I removed a large piece of ſcalp, and found the peri-

cranium, though not detached abſolutely, yet not naturally or firmly adherent. I applied the trephine, and when I had worked a few ſeconds, I took out the inſtrument to clean it, but was much ſurprized to find in it a piece of the upper table of the ſkull. I put in my finger to feel what was underneath, and found that it touched the remaining table, which receded from the finger, and returned again upon removing it; and when I preſſed the ſaid looſe piece hard, the girl's whole frame was ſpaſmodically agitated. What was to be done? it appeared to me, that if all her ſymptoms were not cauſed by the preſſure of the looſe piece, yet they were certainly aggravated by it, that it muſt therefore be taken away at all events, and that it was much too large to be extracted at the preſent opening; beſide which, as it ran upward toward the ſinus, I ſhould not have choſen to have run the riſque of an hæmorrhage from thence while the ſinus was covered with bone. I perforated all round the preſent opening with a ſmall trephine, in ſuch manner, that each perforation ſo bordered on the other as that the whole ſhould make one opening.

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For near one half of the circle the outer table only came away in the inſtrument, leaving the inner looſe and covered with blood, but in all the lower part, the trephine went through both tables, and left the dura mater covered with grumous blood alſo. When the circle was finiſhed, the looſe portion was eaſily taken away; its upper part made a part of the ſagittal ſuture, but no blood followed its ſeparation. The dura mater under the whole was thinly covered with grumous blood. Next day ſhe retained her urine, and opened her eyes. In two more ſhe recovered her ſpeech, and became as rational, as I ſuppoſe ſhe ever had been; and would in all probability have done well, as far as regarded the evils produced by mere preſſure; but after ſome days matter formed between the detached dura mater and the ſkull, and the ſymptomatic fever, uſually accompanying ſuch miſchief, came on with ſuch rapidity, that all the efforts of art were vain.

CASE XLIII.

A Porter at work at the water-ſide, was knocked down by a blow from an iron hook, at the end of the tackle belonging

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ing to a crane. He was ſenſeleſs for near half an hour, but after that was ſo well as to walk home. The next morning he loſt his ſight, and by the evening his ſpeech, and faculty of walking. In this ſtate he was brought to the hoſpital. He was largely let blood, and thoroughly emptied, and I intended, if theſe evacuations did not materially ſerve him, to have examined the ſtate of that part of the bone whereon the blow was received; but that night he died.

Upon examining his head, a piece of the inner table of the right os parietale, of about an inch and half in length, and not quite ſo broad, was found detached from the outer table, having a quantity of blood both between them and on the ſurface of the dura mater.

Theſe are the only inſtances which I have met with of fracture of the internal table alone; though I make no doubt, that ſome of thoſe who have been ſaid and thought to have been deſtroyed by concuſſion, have ſunk under this kind of miſchief.

FINIS.

SOME FEW

GENERAL REMARKS

ON

FRACTURES

AND

DISLOCATIONS.

By PERCIVALL POTT, F.R.S.

AND

SURGEON to ST. BARTHOLOMEW'S-HOSPITAL.

Navem agere ignarus navis timet; abrotonum ægro
Non audet, nisi qui didicit dare. Quod medicorum est
Promittunt medici: tractant fabrilia fabri.

HORAT.

THE SECOND EDITION.

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TO

Doctor WILLIAM PITCAIRN,

Doctor ANTHONY ASKEW,

AND

Doctor RICHARD TYSON,

PHYSICIANS

TO

St. BARTHOLOMEW'S-HOSPITAL,

The following ſheets are addreſſed as a ſmall teſtimony of the regard and eſteem of their

Sincere Friend, and

Very Humble Servant,

Percivall Pott.

ON FRACTURES and DISLOCATIONS.

NO part of ſurgery is thought to be ſo eaſy to underſtand, as that which relates to fractures and diſlocations. Every, the moſt inexpert, and leaſt inſtructed practitioner, deems himſelf perfectly qualified to fulfil this part of the chirurgic art; and the majority, even of theſe, are affronted by an offer of inſtruction, on a ſubject with which they think themſelves already ſo well acquainted.

This is alſo the opinion of a conſiderable part of the people. They regard bone-ſetting (as it is called) as no matter of ſcience; as a thing which the moſt ignorant farrier may with the utmoſt eaſe become ſoon and perfectly maſter of; nay, that he may receive it from his father and family, as a kind of heritage. We all remember the great, though ſhort-lived reputation, of the

late Mrs. Mapp. We all remember, that even the abſurdity and impracticability of her own promiſes and engagements were by no means equal to the expectations and credulity of thoſe who ran after her, that is, of all ranks and degrees of people, from the loweſt labourer or mechanic, up to thoſe of the moſt exalted rank and ſtation; ſeveral of whom not only did not heſitate to believe implicitly the moſt extravagant aſſertions of an ignorant, illiberal, drunken female ſavage, but even ſollicited her company, and at leaſt ſeemed to enjoy her converſation.

The deſire of health and eaſe, like that of money, ſeems to put all underſtandings and all men upon a level, the avaritious are duped by every bubble, the lame and the unhealthy by every quack. Each party reſigns his underſtanding, ſwallows greedily, and for a time believes implicitly the moſt groundleſs, ill-founded and deluſory promiſes, and nothing but loſs and diſapointment ever produces conviction. Arts, trades, and manufactures are allowed to be learnt, in general, by thoſe who have employed a proper quantity of time and attention in ſuch purſuits; and it ſeems moſt ſingularly

unjuſt, as well as untrue, to ſuppoſe that phyſical people are the only part of mankind who are all either ſo dull as not to be able to learn, or ſo profligately wicked as not to practiſe their art to the beſt of their judgment, and to the greateſt poſſible advantage of mankind.--Surely there are, and always have been among us, as well as in all other claſſes, men truly able and perfectly honeſt; men, who well underſtand the ſcience which they profeſs, and who practiſe it, not only with great ability, but with ſtrict integrity. I cannot be ſuppoſed to ſay or to mean this as a vindication of every individual. Different men have different powers and capacities. The multitude with us, as with all ranks and degrees (not excepting any) will always be deficient. Advancement in knowledge will always be owing to the ingenuity and induſtry of a few particular people; but ſuch advancement will always, in due time, more or leſs influence the reſt. They have ſo done; and notwithſtanding that there remains a great deal yet to be done, to bring ſurgery to that degree of perfection of which it is capable, yet, whoever will compare the

preſent practice of it with that of a very few years ago, cannot juſtly or with any degree of candor, with-hold his commendation from his contemporaries.

I remember ſome years ago to have heard a judge from the bench tell a jury, that he believed a country bone-ſetter knew full as much, if not more of the matter of his own buſineſs, than any, the moſt eminent ſurgeon in the kingdom. I will not enter into a diſquiſition concerning the rightneſs of a judge's opinion. Perhaps his lordſhip might very little underſtand the thing concerning which he decided ſo peremptorily; without either injuſtice or partiality, I may certainly ſuppoſe him to have been a much more able lawyer than ſurgeon: and I believe it will alſo be allowed, that general reflections of this kind are, and muſt be, the conſequences of a petulant attempt to be witty, rather than of conviction; and therefore, at beſt, are frivolous and idle. But, on the other hand, I am very willing to allow (what indeed I have already allowed) that many parts of ſurgery are ſtill capable of conſiderable improvement; and this part perhaps, as much as, if not more than any, it being one of thoſe

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in which a general obſervance of and rigid adherence to old preſcribed rules, have prevented the majority of practitioners from venturing to think for themſelves, and have induced them to go on in a beaten track, from which they might not only ſafely, but advantageouſly deviate.

The general doctrine relative to fractures is contaiued under the following heads, as parts of the treatment of them.

Extenſion.
Counter-extenſion.
Coaptation or ſetting.
Application of medicaments.
Deligation or bandage.
Poſition.
Prevention or relief of accidents.

This is the general arrangement of the ſubject by moſt of the writers on it, and a very juſt and proper one it is; but notwithſtanding the parade of books under theſe various heads, much leſs alteration will be met with, ſince the times of Hippocrates, Galen and Celſus, than an inquirer might expect, or than the ſubject is capable of.

I muſt deſire that what I have ſaid may not be miſconſtrued. I do not mean that there are not, and have not at all times

been, men of particular ingenuity, who have deviated from the common methods, and have greatly improved the art; but ſtill the common methods are the ſame, and the multitude of practitioners religiouſly follow them. Let me not therefore be charged with preſumption or arrogance, if I ſay, that under almoſt every of the foregoing heads the practice is capable of conſiderable improvements; improvements which would ſhow rationality and ſenſe in the ſurgeon, and produce eaſe and convenience to the patient.

I am aware that ſome of my readers may be inclined to charge we with affecting to deviate from the commonly preſcribed rules, and to contradict opinions, which a great length of time, and a long ſucceſſion of writers have given ſanction to.

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"Imberbes didicere, ſenes perdenda fateri,"

is a hard leſſon ſometimes to human vanity, and what requires ſome degree of candor to learn. But, on the other hand, if it was not now and then practiſed, I know not how ſuch an art as ſurgery (whoſe baſis is experience) could ever be improved. Our

anceſtors

anceſtors deſerve our beſt thanks for the aſſiſtance which they have given us; where we find them to be right, we are obliged to embrace their opinions as truths; but implicit faith is not required from man to man, and our reverence for our predeceſſors muſt not prevent us from uſing our own judgments. Antient and modern are mere ſounds, and can ſignify nothing in this caſe, unleſs with the former we can connect an idea of truth eſtabliſhed and confirmed by time and experience, and with the latter that of demonſtrable improvement upon what has gone before.

If what I have to urge is not capable of being verified, and confirmed by experience, it muſt ſink into nothing; but if upon trial it ſhall be found by the majority, (as it has been by me and ſome others) to be not only true and practicable, but highly conducive to the eaſe and benefit of the afflicted, it ought to have as much weight, though delivered by a living writer, as if it had proceeded from the remoteſt antiquity: its uſe, not its date, ſhould give it value. If practitioners ſince the time of Albucaſis had been contented with his doctrine, and never had ventured to think for themſelves, ſur-

gery had not been what it now is, and its great merit would ſtill have conſiſted in the multiplicity of its hot irons. In ſhort, to ſuch as think that we are ſeldom or never to deviate from the opinions and practice of thoſe who have gone before us, I ſhall take the liberty of anſwering in the words of the great Mr. Locke, who ſays, "the "floating of other mens opinions in our "brains makes us not one jot the more "knowing, though they happen to be true. "And beaten tracks lead thoſe whoſe "thoughts reach only to imitation, "non "quo eundem eſt, ſed quo itur."

Before I enter on the ſubject, the reader will give me leave to acquaint him, that it is by no means my intention to write a regular treatiſe on fractures, although I think the ſubject well deſerving of, and even requiring one. I only mean to throw out a few hints, which I hope may prove intelligible and uſeful.

The firſt article in the general arrangement is extenſion; under which may alſo be comprehended the ſecond, or counter-extenſion.

In order to accompliſh this, we are directed, if the fracture be of the thigh or leg, to place the patient in a ſupine poſture, and the broken limb in a ſtraight one; then having the upper part of it held firm and ſteady, by proper aſſiſtants, we are ordered by means of hands, ligatures, lacs, or even in ſome caſes by pieces of machinery, to make ſuch an extenſion or ſtretching of the limb lengthways, as ſhall enable the ſurgeon to place the ends of the broken bone in as apt, that is, in as even a poſition, with regard to each other, as the nature of the fracture will admit.----This is a ſhort deſcription of what, in the vulgar phraſe, is calle dſetting a broken bone, and is moſt commonly a painful operation to the patient, a fatiguing one to the operator and his aſſiſtants, and what is worſe, is in many inſtances found to be inefficacious; at leaſt, not fully to anſwer the intention of the one, or the expectation of the other.*

Writers

* "Inſtruments for extenſion are threefold; firſt, the "ſurgeons hands, &c. ſecondly, funes & habenæ, a "ſort

Writers in general are very preciſe and formal in the directions which they have given, for the due and proper accompliſhment of this purpoſe. They have told us, that the extenſion ſhould be made ſlowly and gradually; and ſhould be continued till the ends of the bone are ſeparated from each other ſufficiently, to admit of the fracture being ſet without riſque of breaking off any points or inequalities, and to enable us to place them perfectly ſmooth and even. All

" ſort of bandage fit to pluck at, in order for extenſion;
" thirdly, there are organa & machinemata, engines
" uſed by us and invented by the ancients.
WISEMAN.

The very mention of funes, habenæ, organa and machinemata, implies a force exceeding that of mere hands. A degree of force, which in a fracture never can be wanted, if the limb be rightly placed; a degree of force, which muſt in the nature of things do miſchief; and a degree of force, whoſe whole effect, however great, muſt ceaſe immediately upon its being removed; unleſs the fracture be particularly and luckily circumſtanced.

There are not wanting inſtances of the muſcles ſurrounding a bad though ſimple fracture having been torn by extenſion, and ſpaſm and other miſchief thereby produced. See cautions on this ſubject, laid down by many old writers, particularly by Galen and Albucaſis.

All this, like many other of the preceptive parts of phyſic and ſurgery, is very pretty on paper, but not often found to be practicable in the chamber. The direction to continue the extenſion until the ends of the bones are at a certain diſtance, lengthways from each other, plainly implies a conſiderable degree of violence; the limb muſt by ſuch force be not only made longer than its fellow, or than nature ever intended it ſhould be, but this procruſtian method of lengthening it is ordered to be executed while the limb is in ſuch poſition as to put all the muſcles moſt on the ſtretch, and render them leaſt likely to yield to it. Now, not to ſay a word of the great probability of the points and edges of the fracture wounding the ſurrounding muſcles, or of ſuch wounds being more painful or worſe in their conſequences when inflicted on parts thus ſtretched, or of the addition that ſuch force muſt make to the laceration already neceſſarily made by the fracture; I ſay, not to mention a word of all this, can the method itſelf (without conſidering any accidental adjunct circumſtances) be practiſed in every fracture, or even in the majority of fractures? Will it be done properly by the

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rude, the inattentive, and the ignorant? if attempted by ſuch, will it not be, is it not, frequently productive of pain, tumefaction, inflammation, and extravaſation; which are ſet to the account of the nature of the fracture, and to inevitable neceſſity? and when done ever ſo properly, will it, can it, in an oblique or ſplintered fracture, anſwer the purpoſe it is intended for, or produce a more happy coaptation?

Whence ariſe theſe evils? from whence proceed the difficulty and the ſo frequent diſappointment?

In order to underſtand this rightly, let us for a moment conſider, what is or ought to be meant by the terms extenſion and counter-extenſion, and why they become neceſſary: for if the greater part of the pain attending ſuch method, and the frequency of diſappointment, both to patient and ſurgeon, ſhould be found to ariſe from this part of the proceſs, and that ſuch part can be either diſuſed without prejudice, or altered with advantage, we ought to think ourſelves happy in having it in our power to correct our error.

Neither extenſion nor counter-extenſion can ever be neceſſary, on account of the

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mere fracture, conſidered abſtractedly. The broken ends of the bone or bones are of themſelves inactive, and if not acted upon by other parts they would always remain motionleſs. When any attempt is made to put them into motion, they of themſelves can make no poſſible reſiſtance, nor can any be made on their part, ſave an accidental one ariſing from the points of the fracture being entangled with each other; and when they have been once, by the hand of the ſurgeon, placed properly and evenly with regard to each other, they would of themſelves for ever remain ſo. What then is the reaſon why fractured bones always ſuffer a greater or a leſs degree of diſplacement? why is a broken limb almoſt always ſhorter than its fellow? what creates the reſiſtance, which we always find in attempting to bring the fractured parts aptly together? whence does it proceed, that when we have done all that is in our power (according to this mode of acting) the ends of the fracture will in many caſes become again diſplaced, and lameneſs and deformity frequently enſue? In ſhort, what are the parts or powers which act on the bones, and

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which by ſo acting on them produce all theſe conſequences?

Theſe parts are the muſcles, the only moving powers in an animal body. By the action of theſe on the bones all locomotion is performed, and cannot be performed without them: and although all bones, when broken, are in ſome degree diſplaced and ſhortened, yet it will always be found, that in proportion as the muſcles ſurrounding or in connexion with a bone are ſtrong or numerous, or put into action by inadvertence or ſpaſm, ſo will the diſplacement of the ends of ſuch bone, when fractured be. The even and ſmooth poſition of the fractured ends of a tibia, when the fibula of the ſame leg is entire and unhurt, that is, when the muſcles therefore cannot act upon the former; the viſible and immediate deformity, when both the before-mentioned bones are broken nearly in the ſame place; that is, when the muſcles can act upon and diſplace ſuch fracture; the great difficulty frequently met with in endeavouring to get a broken os femoris, to lie even tolerably ſmooth, and to prevent ſuch broken limb from being much ſhorter than the other,

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are, among others which might be produced, ſuch ſtrong and irrefragable proofs as need no comment.

From the muſcles then, and from them only, proceeds all the difficulty which we meet with in making our extenſion, and by the reſiſtance of theſe, and of theſe only, are we prevented from being always able to put the ends of a fractured bone immediately into the moſt apt contact.

Let us in the next place conſider, what it is which gives to a muſcle, or to the principal muſcles of a limb, the greateſt power of reſiſting any force applied to them ab externo, in order to draw them out into greater length; for whatever that is, the ſame thing will be found to be the cauſe of the different degrees of reſiſtance in ſetting a fracture.

Does not the putting the muſcles in a ſtate of tenſion, or into a ſtate approaching nearly to that of tenſion, almoſt neceſſarily produce this effect? or, in other words does not that poſition of a limb, which puts its muſcles into or nearly into ſuch a ſtate, give ſuch muſcles an opportunity of exerting their greateſt power either of action or of reſiſtance? This I believe cannot be denied.

nied. On the other hand, what is the ſtate or poſition of a muſcle which is moſt likely to prevent it from acting, and to deprive it moſt of its power of reſiſtance? or what is that poſition of a limb, which in the caſe of a broken bone will moſt incapacitate the muſcles from acting on and diſplacing it, and in the greateſt degree remove that reſiſtance which they have it in their power to make to the attempts for the reduction of ſuch fracture? Is it not obvious, that putting a limb into ſuch poſition as ſhall relax the whole ſet of muſcles belonging to or in connection with the broken bone, muſt beſt anſwer ſuch purpoſe? Nothing ſurely can be more evident, if this be granted, will it not, muſt it not follow, that ſuch poſture of a broken limb muſt be the beſt for making the reduction; that is, it muſt be that in which the muſcles will reſiſt the leaſt and be leaſt likely to be injured, that in which the broken bone will be moſt eaſily ſet, the patient ſuffer leaſt pain in preſent, and that from which future lameneſs and deformity will be leaſt likely to happen. A little attention to what frequently occurs, may perhaps ſerve to illuſtrate and confirm this doctrine better than mere aſſertion.

What is the reaſon why no man, however ſuperficially acquainted with his art, ever finds much trouble in ſetting a fractured os humeri, and that with very little pain, and a very ſmall degree of extenſion? Is it not becauſe both patient and ſurgeon concur in putting the arm into a ſtate of flexion; that is, into ſuch a ſtate as relaxes all the muſcles ſurrounding the broken bone? and is it not for the ſame reaſon that we ſo very ſeldom ſee (comparatively ſpeaking of this bone with others) a deformity in conſequence of a fracture of it? Let the reduction be attempted with the arm extended from the body, and the difficulty of ſetting will be much increaſed: let the arm be depoſited in an extended ſtraight poſition, and the fracture will be diſplaced and lie uneven.

Apply the ſame kind of reaſoning to the os femoris; that bone whoſe fracture ſo often lames the patient, and diſgraces the ſurgeon.

Will it not be more cogent, and more concluſive, in proportion as the muſcles in connexion with this bone are more numerous and ſtronger? I would aſk any man who has been much converſant with accidents of this kind, what is the poſture

which almoſt every perſon whoſe os femoris has been newly broken puts himſelf into, in order to obtain eaſe, until he gets proper aſſiſtance? Do ſuch people ſtretch out their limb, and place their leg and thigh ſtraight, and reſting on the calf and heel? I believe ſeldom or never. On the contrary, do not ſuch people almoſt always bend their knee, and lay the broken thigh on its outſide? and is not the reaſon, why this muſt be the moſt eaſy poſture, obvious?

From want of attention to, or from not underſtanding theſe few ſelf-evident principles, many people permit their patients to ſuffer conſiderable inconvenience, both preſent and future.

It is a maxim univerſally taught and received, that a fractured limb may be in ſuch ſtate, as not to admit of the extenſion neceſſary for its being ſet; that is, if aſſiſtance be not at hand when the accident happens; if they who bring the patient home do it ſo aukwardly or rudely as to bruiſe and hurt the part; if from drunkenneſs, folly or obſtinacy in the patient, it happens that the limb is ſo diſordered that it is found to be much ſwollen, inflamed

and

and painful; it is allowed not to be in a ſtate to admit extenſion.

This, I ſay, is a general maxim, and founded upon very juſt principles; but what is the general practice in conſequence of it? It is, to place the limb in an extended ſtraight poſition, to ſecure it in that, and then by proper means, ſuch as fomentation, pultice, &c. to endeavour to remove the tenſion and tumor. Now if it be conſidered that the ſwollen, indurated, and inflamed ſtate of the muſcles is the circumſtance which renders extenſion improper, ſurely it muſt be obvious that ſuch poſition of the limb, as neceſſarily puts theſe very muſcles in ſome degree on the ſtretch, muſt be a very improper one for the accompliſhment of what ought to be aimed at. Under this method of treatment, the ſpace of time which paſſes in the removal of the tenſion is ſometimes conſiderable, ſo conſiderable that a happy and even coaptation becomes afterwards impracticable; and then this accident, which nine times in ten is capable of immediate relief, is urged as an excuſe for unneceſſary lameneſs and deformity.

How then are we to conduct ourſelves in ſuch circumſtances? The nature of the com-

plaint points out the relief. Extenſion is wrong; a ſtraight poſition of the thigh or leg is a degree of extenſion, and a ſtill greater degree of it in proportion as the muſcles are in ſuch circumſtances as to be leſs capable of bearing it. Change of poſture then muſt be the remedy, or rather the placing the limb in ſuch manner as to relax all its muſcles, muſt be the moſt obvious and certain method of relieving all the ills ariſing from a tenſe ſtate of them: which change of poſture will be attended with another circumſtance of very great conſequence; which is, that the bones may in ſuch poſture be immediately ſet, and not one moment's time be thereby loſt; a circumſtance of great advantage indeed; for, whatever may be the popular or prevailing opinion, it is demonſtrably true, that a broken bone cannot be too ſoon put to rights; as muſt appear to every one who will for a moment conſider the neceſſary ſtate of the muſcles, tendons and membranes ſurrounding, and the medullary organs contained within a large bone broken and unſet; that is, lying in an uneven irregular manner. Can any truth be more clear, than that if the fracture, tenſion and tu-

mefaction

mefaction be ſuch that the muſcles cannot bear to be ſtretched out in the manner neceſſary for ſetting the broken bone, without cauſing great pain, and perhaps bringing on ſtill worſe ſymptoms, the more the poſition of that limb makes its muſcles approach toward a ſtate of tenſion, the leſs likely it muſt be that ſuch ſymptoms ſhould remit, and the longer it muſt be before the wiſhed-for alteration can happen; and conſequently, that while the accompliſhment of ſuch purpoſe is by every other means aimed at, the poſition of the limb ought moſt certainly to contribute to, and not to counteract it? In ſhort, if the experiment of change of poſture be fairly and properly made, the objections to immediate reduction, from tenſion, tumour, &c. will moſt frequently be found to be groundleſs, and the fracture will be capable of being put to rights, as well at firſt as at any diſtance of time afterward.

Extenſion having been made, and the broken ends of the bone having been placed as ſmooth and as even as the nature of the caſe will admit, the next circumſtance to be attended to is the application of ſome medicament to the limb; particularly to the

fractured part of it. In this, different people act differently. Some make uſe of an adheſive, or what they chuſe to call a roborant plaſter; ſome, of what is commonly called a cere-cloth; others apply ſpirit. vini with oil, vinegar and white of egg; and others the ſpirit mindereri, the ſolution of crude ſal ammoniac in vinegar and water, or ſome ſuch kind of medicine.

To the cere-cloth, provided it neither ſticks to the ſkin, nor is capable of irritating it, there can be no objection; neither can there be any to all the others, except the adheſive plaſter; that muſt for ever be wrong upon every rational principle. The intention in applying any kind of external medicine to a broken limb is, or ought to be, to repreſs inflammation, to diſperſe extravaſated blood, to keep the ſkin lax, moiſt and perſpirable, and at the ſame time to afford ſome though very ſmall degree of reſtraint or confinement to the fracture, but not to bind or preſs; and it ſhould alſo be calculated as much as poſſible to prevent itching; an herpetic eruption, or an eryſipelatous efflorescence. Adheſive plaſters of all kinds, let the compoſition of them be what it may, are from this one quality the

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leaſt likely to contribute to any of the good ends propoſed, and the moſt likely to be the cauſe of the contrary inconveniences, which ought moſt carefully to be avoided. They obſtruct perſpiration, they heat the ſkin, they produce itching, eruption and inflammation; and if the fracture be quite ſurrounded by them, and the limb be from any cauſe ever ſo little inclined to ſwell, they make a tight, painful and pernicious ſtricture; much greater even than a roller, and leſs likely to relax. At St. Bartholomew's hoſpital we uſe a cerate made by a ſolution of lytharge in vinegar, which with ſoap, oil, and wax, is afterward formed into ſuch conſiſtence as juſt to admit being ſpread without warming.

This lies very eaſy, repels inflammation, is not adherent, comes off clean, and very ſeldom if ever irritates or cauſes either herpes or eryſipelas. But let the form and compoſition of the application made to the limb be what it may, one thing is clear, viz. that it ſhould be put on in ſuch manner as that it may be renewed and ſhifted as often as may be neceſſary, without moving the limb in any manner; it being certain, that when once a broken thigh or leg

has been properly put to rights, and has been depoſited properly on the pillow, it ought not ever to be lifted up or moved from it again without neceſſity, until the fracture is perfectly united; and it is as true, that ſuch neceſſity will not very often occur. This may perhaps ſeem ſtrange to thoſe who are accuſtomed to roll ſimple fractures, and conſequently to lift them up every three or four days, in order to renew ſuch kind of bandage: but the neceſſity of this motion ariſes merely from the kind of bandage made uſe of, and not from any circumſtance of the fracture itſelf. That the frequent motion of a fractured limb cannot poſſibly contribute to the eaſe of the patient, will, I ſuppoſe, be readily admitted; as I ſuppoſe alſo it will, that when a broken limb has been once depoſited in the beſt poſition poſſible, it is impoſſible to mend that poſition, merely by taking ſuch limb up and laying it down again; from whence it muſt follow, that ſuch kind of apparatus as neceſſitates the ſurgeon frequently to diſturb the limb, cannot be ſo good as one that does not; provided the latter will accompliſh the ſame kind of cure as the former: the truth of which poſition will appear in

the moſt ſatisfactory manner to any who will take a view of the method in which ſimple fractures are treated at the before-mentioned hoſpital. Such application having been made as the ſurgeon thinks right, the next thing to be done is to put on a proper bandage.-----That uſed by the ancients and by the majority of the preſent practitioners, is what is commonly called a roller. This is of different length, according to the ſurgeon's choice, or as it may be uſed in the form of one, two or more pieces. Hippocrates uſed three *, Celſus ſix; but the preſent people ſeldom uſe more than one. By ſuch kind of bandage three intentions are aimed at, and ſaid to be accompliſhed, viz. to confine the fracture, to repreſs or prevent a flux of humours, and to regulate the callus †: but whoever will reflect ſeriouſly

* See on this ſubject Fab. ab Aquapendente, Wiſeman, Sculteus, Hildanus, Petit, Du Verney.

† "On applique la premiere ſur l'endroit meme de la "fracture. Son milieu doit repondre au centre. On "fait trois tours circulaires: ce qui ſert a affermir cet "endroit, qui eſt le ſeul, qui ait beſoin d'etre aſſujetti, "comme etant le ſeul qui peut ſe deranger, *& a contenir le ſuc nouricier & empecher, qu'il ne s'echappe trop "abondamment & trop irregulierement a l'entour de la "fracture; ce qui feroit un cal tres difforme.*"

DU VERNEY.

ouſly on this matter will ſoon be convinced, that although ſome ſort of bandage is neceſſary in every ſimple fracture, as well for preſerving ſome degree of ſteadineſs to the limb, as for the retention of the applications, yet none, nor neither of theſe three ends can be anſwered merely, or even principally, by bandage of any kind whatever: and therefore if this ſhould be found to be true, that is, if it ſhould appear that whatever kind of deligation be made uſe of, it cannot be a principal, but only an acceſſorial kind of aſſiſtance, and that in a ſmall degree and very little to be depended upon, it will follow, that ſuch kind of bandage as is moſt difficult to be applied with juſtneſs and exactitude, ſuch as is ſooneſt relaxed and out of order, ſuch as ſtands moſt frequently in need of renewal, and in ſuch renewal is moſt likely to give pain and trouble, muſt be more improper and leſs eligible than one which is more eaſily applied, leſs liable to be out of order, and which can be adjuſted without moving the limb.

The ancient method of applying the roller * in caſe of a ſimple fracture of the leg or thigh,

* See a particular account of this in Fab. ab Aquapendente, and in Serjeant Wiſeman.

thigh, was to make four or five turns round the fracture firſt, and then to continue the bandage upward and downward, until the whole limb was enveloped properly. This was done in this manner with a double view; to keep the broken ends of the bone in their place, and to prevent the influx of humour. Modern practitioners, although they have the ſame ends in view, generally begin their bandage from the inferior extremity of the limb, and continue it up to the top. Whether the old or the later method be followed, whether one or more rollers be made uſe of, the whole is executed while the limb is kept by means of the aſſiſtants in the ſame extended poſture in which the coaptation was made, ſo that the whole bandage is finiſhed before the leg is depoſited on the pillow; in the doing all which, if from the tired ſtate of the ſurgeon *, or either of his aſſiſtants, or if from

* The extraordinary length of time uſed by ſome in putting a fracture to rights, renders what I have called the *tired ſtate of the aſſiſtants* an object of importance. The good poſition of the fracture depends as much or more on them than on the ſurgeon. If the aſſiſtant who holds the foot varies from the proper manner, I defy the ſurgeon to redreſs the fracture without the concurrence of ſuch aſſiſtant.

from the awkwardneſs or unhandineſs of any of the parties concerned, the true and exact poſition of the limb be at all deviated from, the ends of the bone will again be in ſome degree diſplaced, and the bandage inſtead of being of uſe will become prejudicial, by preſſing hard on the inequalities of the fracture: to which let me add, that the roller, eſpecially when applied to a leg, if it be not put on with due dexterity, that is, if it does not ſet perfectly ſmooth and even, is the moſt unequal and worſt kind of bandage in uſe.

Theſe objections, however juſt, are not the leaſt to which the roller in the caſe of ſimple fracture of the leg or thigh are liable; for, as I have already hinted, it muſt in a very ſhort ſpace of time, even while the parts ſurrounding the fracture are in the moſt tender and moſt painful ſtate, be renewed, and that more than once; which renewal cannot be executed without again taking the limb off from the pillow, again committing it to the hands of aſſiſtants, and again running a riſque of diſplacing the fracture: all which, not to mention the repetition of pain to the patient every time ſuch operation is performed, and which muſt be at leaſt every four or five days, are

(as I have already ſaid) very material objections to the roller, even in the moſt judicious and dexterous hands, and ſtill more ſo in thoſe of the rude and ignorant.

The prevention of a flux of humors to a broken limb, by bandage, is a common phraſe; but they who uſe it have either no idea at all annexed to it, or a very erroneous one.

If by the points and edges of the broken bone the muſcles and membranes be unavoidably wounded and torn, or if the ſame kind of miſchief be incurred by the inadvertence or indiſcretion of the patient, or of thoſe who aſſiſted in getting him home, or from the violence uſed in extending the limb and ſetting the fracture, inflammation muſt be excited, and pain and tumefaction will be the conſequence; and theſe will continue for ſome time in every fracture; but that ſpace will be longer or ſhorter in different caſes and under different circumſtances: evacuation, reſt, and a favourable poſition of the limb will, and do in general, remove all theſe complaints; but bandage can contribute nothing more than by keeping the applications in their proper place; ſo far from it, that if the bandage be a roller

it muſt, by the frequent neceſſity of its being adjuſted, and the frequent motion of the limb, in ſome degree counteract the proper intention of cure.

The old writers are in general very preciſe as to the number of days during which the roller ſhould be ſuffered to remain without being ſhifted, and the number of times which ſuch ſhifting ſhould be repeated within the firſt fortnight *. This exactitude is by no means neceſſary; but if the bandage be ſuppoſed to be of any uſe at all, it is obvious, that it ought to be renewed or adjuſted as often as it may ceaſe to perform the office for which it is deſigned, or whenever it ſhall be found to counteract ſuch office, that is, as often as it ſhall become ſo ſlack as not to contain the fracture at all, or whenever the limb ſhall be ſo ſwollen, that the roller makes an improper degree of ſtricture; the former generally occurs every four

* "Tertio die a deligatione facta, Hippocrates faſcias reſolvit, &c. Facta bona deligature & pruritu non infectante, a tertio uſque ad ſeptimum oportet ægrum deligatum detinere.

"Septimo membrum rurſus ſolvendum perfundendum aqua tepida & ligandum."

Fab. ab Aquapendente.

four or five days, the latter is moſt frequent within the firſt week.

In moſt of the writers on the ſubject of fractures, we alſo find marks or ſigns laid down for our information concerning the due or undue effect of the bandage on the limb. They tell us, that when that part of it which is below the termination of the roller does not ſwell at all, that the bandage is not ſufficiently ſtrict, and will not retain the fracture; that when the ſame part is conſiderably ſwollen, or tenſe, or inflamed, it implies, that the binding is too ſtrait, and that a moderate degree of tumefaction is a ſign that the deligation is properly executed *

* See on this Fab. ab Aquapendente, who ſpeaks or rather copies the ſentiments of Hippocrates and Celſus. " Terminus in ſtringendo debet eſſe bona laborantis to-
" lerantia: ut deligatum leviter premat, & ſic tum con-
" tineat & ſtabiliat fracturam, tum humores exprimat.
" Sunt etiam alia hujus ſigna, quæ altero die apparent;
" ſi enim æger eo die quo deligatus ſentiat ſe valentius
" ſtringi, poſtero vero die tumor laxus, mollis & parvus
" appareat, bona eſt deligatio, quia jam humores a parte
" fracta ſunt expreſſi. Si vero aut nullus tumor aut
" magnus & durus poſtridie in manu vel pede appareat,
" prava eſt deligatura; quia illa non continet hæc vero
" nimis arcta eſt & inflammationem movet. Id notan-
" dum

In conſequence of theſe precepts, many practitioners look more anxiouſly after this degree of tumefaction, than after the true and exact poſition of the limb, and cannot be induced to believe, that any thing can be wrong under this appearance; although if they would for once aſſume the liberty of thinking for themſelves, they might be convinced, that even this degree of ſwelling is wrong, that it implies ſome kind of obſtruction to the circulation, and cannot ſerve any good purpoſe; and conſequently that as far as it may be ſuppoſed to be the effect of bandage, ſo far that bandage muſt be faulty.

The third purpoſe for which the roller is ſaid to be uſed, is the regulation and reſtraint of the callus.

If we were to form our notion of callus by what the generality of writers have ſaid on this ſubject, we ſhould ſuppoſe, that it was not only a particular juice always ready for the purpoſe, but that, if not reſtrained and regulated by art, it would always flow in ſuch quantity, as to create trouble and deformity;

" dum faſcias magis ſtringi debere in parte fracta, quam " alibi, ut pars fracta magis illæſa ſervetur, ab humo- " rum defluxu."

deformity; that there were ſpecific remedies for increaſing or decreaſing it, and that it always required the hand and act of ſurgery to manage it. That the callus is ſo far a particular juice, as that it conſiſts of whatever is deſtined to circulate through the bones for their particular nouriſhment, is beyond all doubt; and that this gelatinous kind of fluid is the medium by which fractures are united is as true; but that it requires art to manage it, or that art is in general capable of managing and directing it, is by no means true. That this callus or uniting medium does oftentimes create tumefaction and deformity, or even lameneſs, is true alſo; but the fault in theſe caſes does not lie in the mere redundance of ſuch juice; it is derived from the nature of the fracture, from the inequality of it when ſet, and from the unapt poſition of the broken ends with regard to each other; nor is ſurgery or the ſurgeon any otherwiſe blameable in this caſe, than as it was, or was not originally in their power to have placed them better. It is the inequality of the fracture which makes both the real and apparent redundance of callus, and the tumefaction in the place of union. When a

bone has been broken tranſverſely, or nearly ſo, and its inequalities are therefore neither many nor great, when ſuch broken parts have been happily and properly coaptated, and proper methods have been uſed to keep them conſtantly and ſteadily in ſuch ſtate of coaptation, the divided parts unite by the intervention of the circulating juice, juſt as the ſofter parts do, allowing a different ſpace of time for different texture and conſiſtence. When the union of a broken bone under ſuch circumſtances has been procured, the place where ſuch union has been made will be very little perceptible, it will be no deformity, nor will it occaſion any inconvenience. It will indeed be diſcoverable, like a cicatrix of a wound in a ſofter part, but there will be no redundance of callus, becauſe none will be wanted; neither will there be any neceſſity for any particular management on the part of the ſurgeon, to repreſs or keep it in order: But when a bone has been broken very obliquely or very unequally, when the parts of a fracture are ſo circumſtanced as not to admit of exact coaptation, when ſuch exact coaptation as the fracture perhaps would have admitted has not been judiciouſly made, when from unmanageable-

neſs,

neſs, inadvertence or ſpaſm, the proper poſition of the limb has not been attended to or preſerved, in all ſuch caſes there muſt be conſiderable inequality of ſurface; there muſt be riſings on one ſide and depreſſions on another; and in ſuch caſes the juices circulating through the bone, cannot accompliſh the union in the ſame quantity, the ſame time, or in the ſame manner. The broken parts not being applied exactly to each other, there cannot be the ſame aptitude to unite; and according to the greater or leſſer degree of exactitude in the coaptation, that is, according as the ends of the bones are or have been placed more or leſs even with regard to each other, will the inconvenience and the deformity be; and ſtill moſt where the fracture is not ſet at all, but the broken ends of the bone unite laterally, or by touching each other's ſides. The reaſon of all this is ſo obvious, without having recourſe to a particular ſpecific juice under the name of callus, that it would be an inſult upon the reader's underſtanding to explain it farther *. The perioſteum covering every

* On the ſubject of callus, the editor of Du Verney tells a ſtory from Galen, and which himſelf ſeems not to

 diſbelieve,

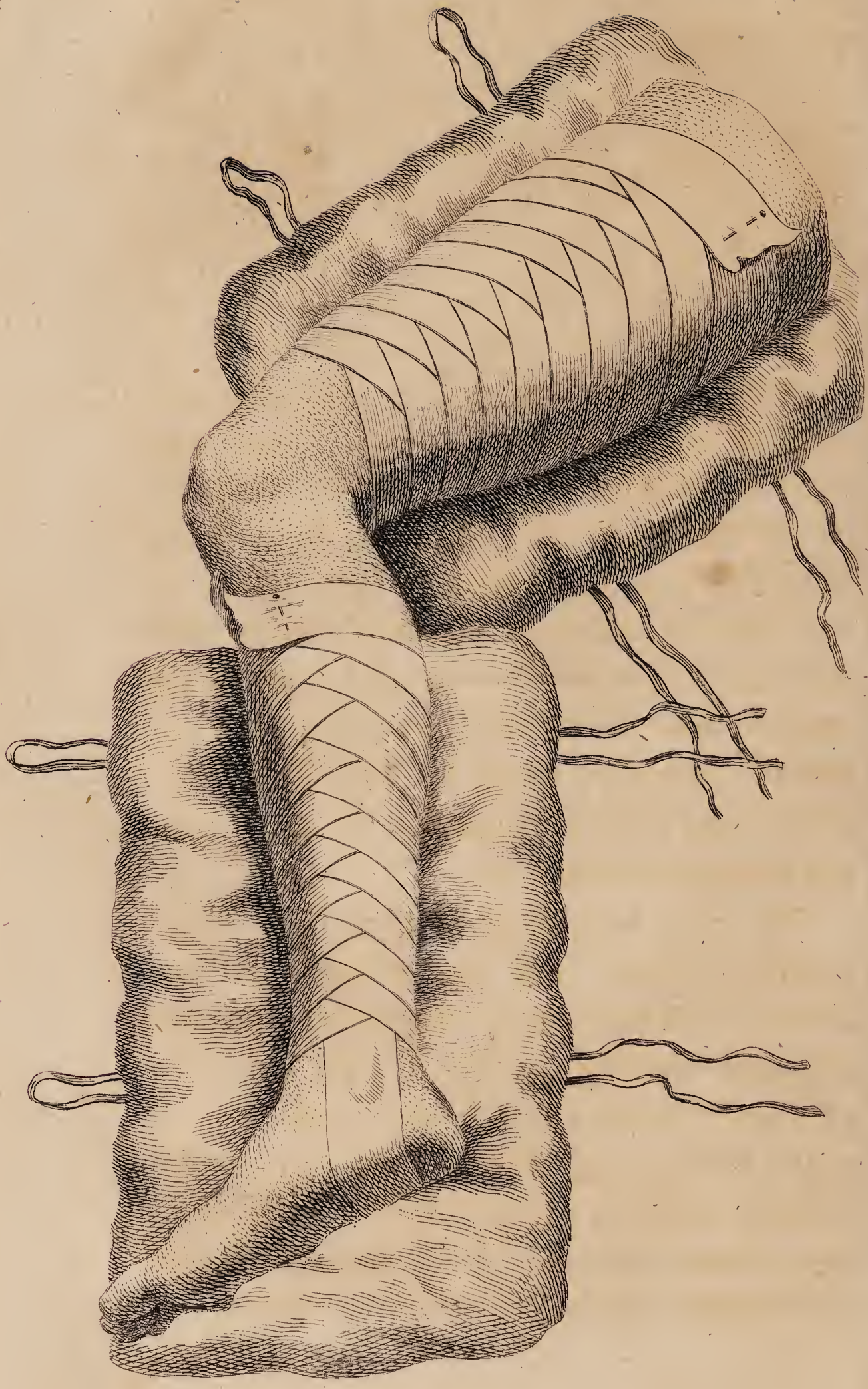
every fracture, will remain thickened for ſome time, and a degree of fulneſs or riſing will be thereby cauſed about the place where ſuch fracture has been united, but time, and the uſe of the muſcles, ſoon in general remove this.

In ſhort, this doctrine of callus, conſidered as a particular kind of juice, and as being liable to great redundance if not prevented by art, has not only miſled many people, but has often been made uſe of as a cover to ignorance and neglect. When lameneſs and deformity have been the conſequences of one or both theſe cauſes, more than of the nature and circumſtances of a fracture, the callus has been found ready at hand to take the blame, and the ideal exuberance of this cement has often been urged, as an excuſe for real want of knowledge, or for groſs neglect.

The beſt and moſt uſeful bandage for a ſimple fracture of the leg or thigh, is what is commonly known by the name of the eighteen tailed bandage, or rather one made on the ſame principle, but with a little difference

diſbelieve, viz. that a callus in a particular caſe, was ſo redundant as to tranſude through the ſkin, and to keep the compreſſes conſtantly wet.

To face page 37.



ference in the diſpoſition of the pieces. The common method is to make it ſo, that the parts which are to ſurround the limb make a right angle with that which runs lengthways under it; inſtead of which, if they are tacked on ſo as to make an acute angle, they will fold over each other in an oblique direction, and thereby ſit more neatly and more ſecurely, as the parts will thereby have more connection with and more dependance on each other. In compound fractures, as they are called, every body ſees and acknowledges the utility of this kind of bandage preferable to the roller, and for very obvious and convincing reaſons, but particularly becauſe it does not become neceſſary to lift up and diſturb the limb every time it is dreſſed, or every time the bandage looſens.

The pain attending motion in a compound fracture, the circumſtance of the wound, and the greater degree of inſtability of parts thereby produced, are certainly very good reaſons for dreſſing ſuch wound with a bandage, which does not render motion neceſſary; but I ſhould be glad to know what can make it neceſſary, or right, or eligible, to move a limb in the caſe of

ſimple fracture? what benefit can be propoſed by it? what utility can be drawn from it? When a broken bone has been well ſet, and the limb well placed, what poſſible advantage can ariſe from moving it? ſurely none; but, on the contrary, pain and probable miſchief. Is it not the one great intention, to procure unition? Can moving the limb every two or three days contribute to ſuch intention? muſt it not on the contrary obſtruct and retard it? Is not perfect quietude as neceſſary toward the union of the bone, in a ſimple as in a compound fracture? It is true, that in the one there is a wound which requires to be dreſſed, and the motion of the limb may in general be attended with rather more pain than in the other; but does motion in the ſimple fracture give eaſe, or procure more expeditious union?

Every benefit then which can be ſuppoſed to be obtained from the uſe of the common bandage or roller is equally attainable from the uſe of that which I have juſt mentioned, with one additional, and to the patient moſt invaluable advantage, viz. that of never finding it neceſſary to have his leg or thigh once during the cure removed from the pillow on

which

which it has been properly depoſited. In ſhort, to quit reaſoning and ſpeak to fact, it is the conſtant practice at St. Bartholomew's, and attended with all poſſible ſucceſs. We always uſe the eighteen-tailed bandage, and never move the limb to renew or adjuſt it.*

The parts of the general apparatus for a ſimple fracture, which come next in order, are the ſplints.

Theſe are generally made of paſte-board, wood, or ſome reſiſting kind of ſtuff, and are ordered to be applied lengthways on the broken limb; in ſome caſes three, in others four; for the more ſteady and quiet detention of the fracture.

That ſplints properly made and judiciouſly applied are very ſerviceable, is beyond all doubt, but their utility depends much on their ſize and the manner in which they are applied.

In general practice, they are made of ſuch length, as not to reach either upward or

 downward,

* See the different opinions of different French practitioners, with their reaſons on this ſubject, in Du Verney, Traitè des Maladies des Os.

downward, ſo far as the roller extends; not to comprehend either the upper or the lower joint of the broken bone, and to exceed the fracture either way not many inches: they do not, for example, in the broken leg, comprehend either the joint of the knee, or the joint of the ancle, and act only on the fracture.* In

* This is the old doctrine, and has been almoſt univerſally and conſtantly adhered to and followed. Our forefathers, finding that ſuch ſplints as they uſed and applied in their manner excited pain and inflammation, did not uſe, but forbad them until after ſeven days were paſt, and the firſt inflammation, as they thought, was over.

After this, they put them on to ſtrengthen the fracture, as they ſaid, and therefore made them ſhort for that purpoſe only, expreſsly cautioning us againſt the only method of applying them (in the caſe of a broken leg) in which they can be really uſeful, viz. that in which they comprehend both the knee and ancle.

"Ferularum uſus idem eſt ac pannorum ad fractum "os continendum, ut maneat immotum, etiamſi mem- "brum univerſum moveatur.

"Jubet Hippocrates leves eſſe ferulas & æquales & ad "extrema reſimas, &c.

"Sed & *breviores ferulas* eſſe *præcipit ipſa* vinctura, ne "quando cutem proximam tentare valeant eminentem "plerumque ob humores receptos, quos faſciæ extur- "bant. Id quoque cavere oportet, ne ad oſſium emi- "nentias, quales in ima tibia & ſura ſunt, ferulæ per- "tingant, &c. &c. &c."

Oribaſius de Fracturis.

"Sed

In this manner of application and of this ſize, they are in fact neither more nor leſs than compreſſes, and compreſſes made of very bad materials. All the good that ever is, or that can be done by them, when of ſuch length and ſo applied, might certainly be done in a better manner by a more proper kind of compreſs, and every diſadvantage, which a hard reſiſting compreſs, injudiciouſly applied, is capable of producing, is probable to reſult from them thus uſed.

The true and proper uſe of ſplints is, to preſerve ſteadineſs in the whole limb, without compreſſing the fracture at all. By the former they become very aſſiſtant to the curative intention, by the latter they are very capable of cauſing pain and other inconveniences; at the ſame time that they cannot in the nature of things, contribute to the ſteadineſs of the limb.

In order to be of any real uſe at all, ſplints ſhould, in the caſe of a broken leg, reach

" Sed hoc tempore (poſt ſeptimum diem) vice plagularum oportet ferulas apponere.

" His utebatur Hippocrates demum poſt ſeptimum " diem; quia ante ſeptimum magis urgebat intentio arcendæ inflammationis, quam intentio ſtabiliendi fracturam; poſt ſeptimum autem contra accidit."

Fab. ab Aquapendente.

reach above the knee and below the ancle; ſhould be only two in number, and ſhould be ſo guarded with tow, rag or cotton, that they ſhould preſs only on the joints, and not at all on the fracture.

By this they become really ſerviceable; but a ſhort ſplint, which extends only a little above and a little below the fracture, and does not take in the two joints, is an abſurdity; and, what is worſe, it is a miſchievous abſurdity.

By preſſing on both joints, they keep not only them, but the foot ſteady; by preſſing on the fracture only, they cannot retain it in its place, if the foot be in the ſmalleſt degree diſplaced, but they may, and frequently do occaſion miſchief, by rudely, preſſing the parts covering the fracture againſt the edges and inequalities of it.

I ſuppoſe it will be ſaid, that although ſhort ſplints do not of themſelves ſuſtain and keep ſteady the two joints, and conſequently the limb, yet that purpoſe in the broken leg may be and is fulfilled by junks, fanons and other contrivances: To which I anſwer, that then the ſhort ſplints are in that caſe of no uſe at all, and had better be laid aſide; they ſhould be uſed for no other

pur-

purpoſe, but that of keeping the limb ſteady; and if they do not anſwer that end, they are an incumbrance, and multiply the articles in the apparatus for a fractured leg, very unneceſſarily.

In the caſe of a fractured os femoris, if the limb be laid in an extended poſture, one ſplint ſhould certainly reach from the hip to the outer ancle, and another (ſomewhat ſhorter) ſhould extend from the groin to the inner ancle. in the caſe of a broken tibia and fibula, there never can be occaſion for more than two ſplints, one of which ſhould extend from above the knee to below the ancle on one ſide, and the other ſplint ſhould do the ſame on the other ſide. The manner of applying them, if the limb be depoſited in a ſtate of flexion, will come under the next article.

This, and indeed the moſt eſſential article in the treatment of a fracture is, the poſition of the limb. Upon the judicious or injudicious, the proper or improper execution of this, depends the eaſe of the patient during his confinement, and the free uſe and natural appearance of his limb afterward.

If I meant to deſcribe, or if I approved (pardon the phraſe) the common method of placing the broken leg and thigh in a ſtraight manner, this would be the place to mention the many very ingenious contrivances and pieces of machinery, which practitioners, both ancient and modern, have invented for the purpoſe of keeping the whole limb ſtraight and ſteady, that is, of keeping all the muſcles ſurrounding the fractured bone conſtantly upon the ſtretch, and at the ſame time of preventing any inequality in the union of it, and any ſhortening of the limb, in conſequence of ſuch inequality.

But as it is my intention by theſe ſheets, to inculcate another, and as it appears to me a better diſpoſition of the limb, in which ſuch boxes, cradles and pieces of machinery are not wanted, nor can be uſed, it is needleſs for me to ſay any thing about them.

According to this plan, the fractured leg and thigh ſhould be depoſited on the pillow, in the very poſture in which the extenſion was made, and the fracture ſet, that is, with the knee bent.

I have already been ſo explicit, or perhaps prolix, on the tenſe and lax ſtate of the muſcles, as depending on poſture, under the head of extenſion, that I ſhall ſpare the reader, as well as myſelf, a good deal of trouble by referring back to that article. All that is there urged, or that can be urged for making the extenſion, that is, for ſetting a fracture in ſuch diſpoſition of a limb or its muſcles, is equally powerful and concluſive with regard to the manner of depoſiting and leaving it after it has been ſet. Whatever render reduction and coaptation eaſy, muſt as neceſſarily maintain eaſe during the confinement, preſerve rectitude of figure, and prevent diſplacement. The ſame principle muſt act on both occaſions, and whether the doctrine be right or wrong, conſidered by itſelf, it muſt be equally ſo in both circumſtances, that is, in the manner of ſetting a fracture, and in the manner of depoſiting the limb afterward *. In the caſe

* It has been ſaid, that the ſtraight poſition of a limb, by putting the muſcles on the ſtretch, induces them to contribute to the ſecurity of the fracture againſt diſplacement. If this be the caſe in general, how happens it that thoſe bones are always found moſt liable to be diſplaced when broken, and to be moſt difficult to keep in their proper place, which are ſurrounded by the moſt and by the ſtrongeſt muſcles?

caſe of the fractured os humeri, the only poſition in which it can with any tolerable convenience to the patient be placed is, with the elbow bent, that very poſition which neceſſarily relaxes and removes all the reſiſtance of the ſurrounding muſcles. Daily experience evinces the utility of this, by our very ſeldom meeting with lameneſs or deformity after it, notwithſtanding the prevailing apprehenſion of exuberant callus.

The deformity frequently conſequent to the fracture of the bones of the cubit, particularly that of the radius only, will generally, if not always, be found to be in proportion as the muſcles concerned in the pronation and ſupination of the hand happen to be put more or leſs into a ſtate of action, or tenſion, by the poſition of the limb.

In the thigh, the caſe is ſtill more obvious, as the muſcles are more numerous and ſtronger.

The ſtraight poſture puts the majority of them into action, by which action that part of the broken bone, which is next to the knee, is pulled upward, and by paſſing more or leſs underneath that part

which

which is next to the hip, makes an inequality or riſing in the broken part, and produces a ſhortneſs of the limb.

In the fracture of both bones of the leg, the caſe is ſtill the ſame; a ſtraight poſition puts the muſcles upon endeavouring to act; a moderate flexion of the knee relaxes them, and takes off ſuch propenſity.*

The diſpoſition therefore of the broken cubit ought to be that which, by putting the hand into a middle ſtate between pronation and ſupination, and by bending the fingers moderately, keeps the radius ſuperior to the ulna; or in other words, the palm of the hand ſhould be applied to the breaſt, the thumb ſhould be ſuperior, the little finger inferior; and the hand ſhould be kept in this poſture conſtantly by means of two ſplints, which ſhould reach from the joint of the elbow on each ſide, and ſhould be extended below the fingers; or the ſame purpoſe may be ſtill better anſwered by a ſimple neat contrivance of the very ingenious Mr. Gooch

* In proportion as the fracture ſhall happen to be more or leſs oblique, the truth of this doctrine will upon experiment be found to be more or leſs apparent, as well as uſeful.

Gooch of Norfolk; of which he has given a draught, and which is preferable to a common ſplint, by its admitting the fingers to be more eaſily bent.

The poſition of the fractured os femoris ſhould be on its outſide, reſting on the great trochanter; the patient's whole body ſhould be inclined to the ſame ſide; the knee ſhould be in a middle ſtate, between perfect flexion and extenſion, or half bent; the leg and foot, lying on their outſide alſo, ſhould be well ſupported by ſmooth pillows, and ſhould be rather higher in their level than the thigh; one very broad ſplint of deal, hollowed out and well covered with wool*, rag, or tow, ſhould be placed under the thigh, from above the trochanter quite below the knee, and another ſomewhat ſhorter ſhould extend from the groin below the knee on the inſide, or rather in this poſture on the upper ſide; the bandage ſhould be of the eighteen-tail kind, and when the bone has been ſet, and the thigh well placed on the pillow, it ſhould not, without

* If the pillow on which the broken thigh is placed be not too thick, the ſplint may with equal advantage be placed underneath ſuch pillow, and in many caſes this will be found to be the beſt manner of uſing it.

without neceſſity, (which neceſſity in this method will ſeldom occur) be ever moved from it again until the fracture is united; and this union will always be accompliſhed in more or leſs time, in proportion as the limb ſhall have been more or leſs diſturbed.

In the fracture of the fibula only, the poſition is not of much conſequence, becauſe by the tibia remaining intire, the figure of the leg is preſerved and extenſion quite unneceſſary; but ſtill even here the laying the leg on its ſide, inſtead of on the calf, is attended with one very good conſequence, viz. that the confinement of the knee, in a moderately bent poſition, does not render it ſo incapable of flexion and uſe afterward, as the ſtraight or extended poſition of it does, and conſequently that the patient will be much ſooner able to walk, whoſe leg has been kept in the former poſture, than he whoſe leg has been confined in the latter.

In the fracture of both tibia and fibula, the knee ſhould be moderately bent, the thigh, body and leg in the ſame poſition as in the broken thigh. If common ſplints be uſed, one ſhould be placed underneath the

leg, extending from above the knee to below the ancle, the foot being properly ſupported by pillows, bolſters, &c. and another ſplint of the ſame length ſhould be placed on the upper ſide, comprehending both joints in the ſame manner; which diſpoſition of ſplints ought always to be obſerved, as to their length, if the leg be laid extended in the common way, only changing the nominal poſition of them, as the poſture of the leg is changed, and calling what is inferior in one caſe, exterior in the other, and what is ſuperior in one, in the other interior.*

If Mr. Sharpe's ſplints be made uſe of, there is in one of them a proviſion for the more eaſy ſupport of the foot and ancle, by an excavation in, and a prolongation of the lower

* All writers on this ſubject agree in giving us cautions about defending the heel, and filling up the hollow from it to the calf of the leg; and this they do on account of the pain, excoriation, and even ulceration, which ſometimes attends the ſtraight poſition, with the limb reſting on the heel.

Many of them have alſo taken notice of an accident ſometimes attendant on a broken leg, but which really ought to be ſet to the account of the poſture in which ſuch leg is placed, more than to that of the fracture; I mean the ſhrinking or waſting of the calf.

lower or fibular ſplint, for the purpoſe of keeping the foot ſteady.

I hope that I have expreſſed my meaning clearly; I ſhould be very ſorry to be miſtaken, becauſe it appears to me to be a matter of ſome conſequence; and if what I have ſaid be intelligible, the reader will underſtand from thence, that I mean to ſignify, that (in my opinion,) extenſion will in general be made with more facility, and coaptation more happily executed; that a patient will ſuffer a great deal leſs pain during theſe operations, as well as during the neceſſary confinement for a broken leg or thigh; and that both patient and ſurgeon will be leſs likely to be diſappointed in their intention and wiſh; that is, that the former will be leſs liable to lameneſs or deformity, when a fractured thigh or leg has been treated in the way I have deſcribed than in the common one.

The reſiſtance neceſſarily made by the muſcles, joined to the great inſtability of parts in every ſpecies of fractured leg or thigh, except in the few where the bones

are broken tranſverſely, has conſtantly exerciſed the invention and ingenuity of practitioners, in deviſing means to prevent inequality in the callus, as it is called, and ſhortneſs and deformity in the limb. Our books abound with draughts and deſcriptions of machines for this purpoſe; ligatures, pullies, leaden weights, and fracture-boxes, ſo conſtructed, as to overcome and conſtantly to reſiſt that action of the muſcles ſurrounding the broken bone, that natural tendency in them to contract, which the extended poſition of the limb neceſſarily induces. Every body who has been converſant with matters of this ſort knows, that even the beſt of theſe various contrivances often prove ſucceſsleſs, and every one who will reflect ever ſo little may ſee why they muſt be ſo. That they do prove ineffectual, the number of deformed legs and ſhortened thighs, which are daily met with, evinces; and that they muſt frequently prove ſo will be obvious to every one, who will conſider that the effect can laſt no longer than the cauſe is continued, unleſs there happens to be ſome very favourable

circum-

circumſtance in the fracture itſelf. What I mean is this, when the reduction of the fracture is ſet about, the limb is put into ſuch poſition, that the ſurrounding muſcles reſiſt the extending force very conſiderably, and this in proportion to their ſtrength and number: that force is continued and increaſed till the muſcles give way, and the reſiſtance being overcome, an opportunity is thereby obtained of placing the ends of the fracture in as apt poſition with regard to each other, as the nature of it will admit. If the fracture be of the tranſverſe kind, that is, if the ends of the broken bone be large, and afford a good deal of ſpace for contact with each other, ſuch appoſition will contribute a good deal to the keeping the limb ſteady and the fracture even; but if the fracture be of the oblique kind, if there be ſeveral looſe pieces, and conſequently neither large contact nor ſtability from the appoſition, or if due extenſion has not been made or could not, or if the ends of the bones have not been judiciouſly and properly ſet, the muſcles will act as ſoon as the extenſion is relaxed, the fracture will be more or leſs diſplaced, according to the nature of it, the limb will be ſhortened, the

time of union will be prolonged, and the place of it (the callus, as it is called) will be in proportion more or leſs unequal.

I take it for granted that it will be aſked, Have not our anceſtors in all times happily redreſſed fractured legs and thighs, by the method which they have delivered down to us, and which in the preceding pages I have taken the liberty to object to? have not ſuch limbs frequently been rendered as ſtraight, as uſeful, and as little deformed as poſſible? I anſwer, moſt certainly, yes; it is an undoubted truth and cannot be denied. But in my turn, let me be permitted to aſk, Whether in the ſame method great and even unſurmountable difficulty is not frequently met with? whether in many caſes the act of ſetting, as it is called, is not exceſſively painful at the time, and productive of inflammation and other diſagreeable ſymptoms afterward? and whether in ſpite of all care, of every contrivance, of every ſpecies of machinery which has yet been uſed, broken thighs and legs are not often, very often left deformed, crooked and ſhortened, and that merely from the action of the muſcles and the obliquity or ſhattered ſtate of the fracture? The fact is notorious, and the

ſole queſtion is, Whether or no a different diſpoſition of the parts, preventing ſuch action and ſuch reſiſtance, will in many inſtances prevent theſe evils? to which, from repeated experience, I anſwer, yes. If this ſhould be found to be the caſe in general, of which I make no doubt; that is, if by this method, many of ſuch unfortunate caſes, as in the common method of treatment diſappoint both patient and ſurgeon, ſhould be found in general to ſucceed ſo well as to ſatisfy both, it will prove all I wiſh it ſhould prove. Superior utility and more frequent ſucceſs are all I contend for.

Many people did very well under amputation before the double inciſion was practiſed; but is the double inciſion therefore no improvement? The operation for the bubonocele may be performed with that clumſy inſtrument the probe ſciſſars, but is the biſtoury therefore not preferable? A ſurgeon may cut off ſome ounces, or even pounds of fleſh from a patient's backſide, in order to cure a ſinus, but is the cure by the ſimple diviſion of that ſinus therefore not eaſier or more expeditious? Neither of theſe can (I think) be proved, unleſs it can at the ſame time be proved, that pain is no

evil, confinement not at all irkſome, and that deformity and elegance of figure are ſynonimous terms.

Let not the reader fancy that I would dare to amuſe him with ſpeculation, or merely ſpecious reaſoning on a ſubject like this. What I have ſaid is from experience, repeated experience both of myſelf and of others, for a conſiderable length of time paſt, and on a great variety of ſubjects; from an experience which has perfectly ſatisfied me, and I think will every man who will make the trial fairly and candidly.---I do not pretend to ſay, that by theſe means every kind of broken bone will infallibly and certainly be brought to lie ſmooth, even, and of proper length; if I did, they who are verſed in theſe things, would know that I ſaid too much; but I will ſay, (what is ſufficient for my purpoſe) that it will not only ſucceed in all thoſe, in which the old method can ever be ſucceſsful, but alſo in the majority of thoſe in which it is not nor in the nature of things can. In thoſe fortunate caſes, in which either method will do, the old one is fatiguing, inconvenient, and even ſometimes offenſive, from the ſupine

and

and confined poſture of the patient; whereas that which is here propoſed gives the patient much greater liberty of motion for every purpoſe either of choice or neceſſity, and in many of thoſe caſes, wherein the old method proves moſt frequently ſo far ſucceſsleſs, as to leave the limb ſhort, lame, or deformed; I ſay, in moſt of theſe, the propoſed method will not be attended with theſe inconveniences.

I have already ſaid, that in moſt caſes of broken thigh or leg, the method juſt deſcibed will be attended with great ſucceſs: but there is one particular caſe in which its utility is ſtill more conſpicuous; a caſe which, according to the general manner of treating it, gives infinite pain and trouble both to the patient and ſurgeon, and very frequently ends in the lameneſs and diſappointment of the former, and the diſgrace and concern of the latter: I mean the fracture of the fibula attended with a diſlocation of the tibia.

Whoever will take a view of the leg of a ſkeleton, will ſee that although the fibula be a very ſmall and ſlender bone, and very inconſiderable in ſtrength, when compared with the tibia, yet the ſupport of the lower

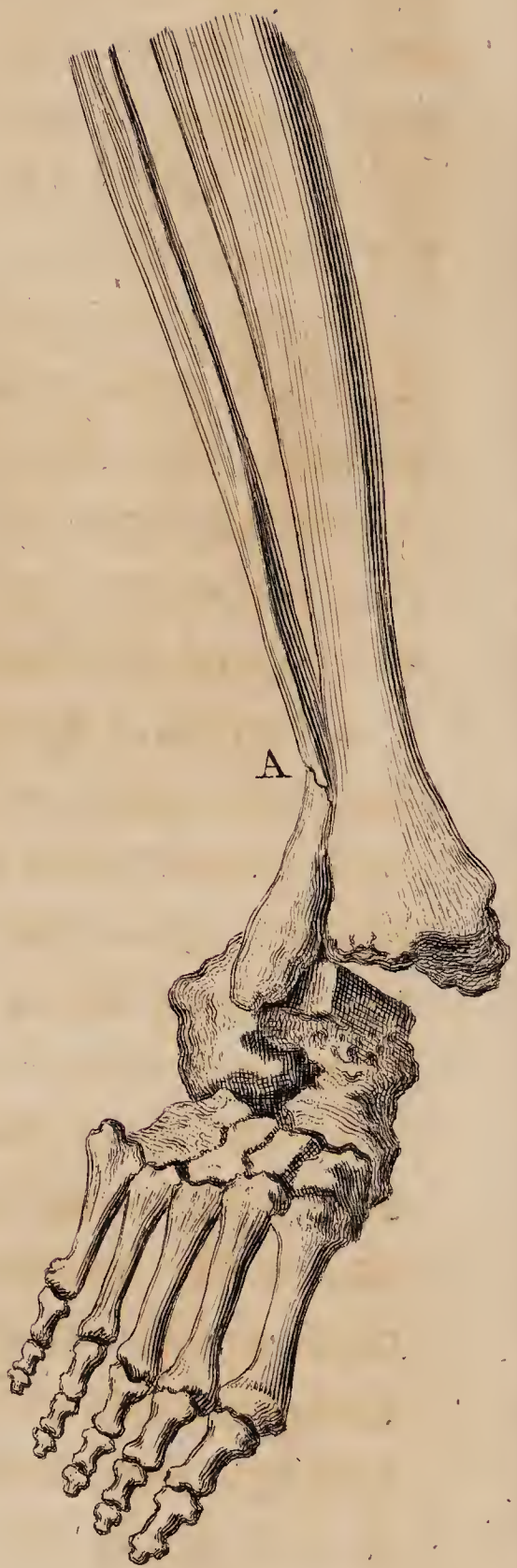
joint

joint of that limb, (the ancle) depends ſo much on this ſlender bone, that without it the body would not be upheld, nor locomotion performed, without hazard of diſlocation every moment. The lower extremity of this bone, which deſcends conſiderably below that end of the tibia, is by ſtrong and inelaſtic ligaments firmly connected with the loſt-named bone, and with the aſtragalus, or that bone of the tarſus which is principally concerned in forming the joint of the ancle. This lower extremity of the fibula has, in its poſterior part, a ſuperficial ſulcus for the lodgment and paſſage of the tendons of the peronei muſcles, which are here tied down by ſtrong ligamentous capſulæ, and have their action ſo determined from this point or angle, that the ſmalleſt degree of variation from it, in conſequence of external force, muſt neceſſarily have conſiderable effect on the motions they are deſigned to execute, and conſequently diſtort the foot. Let it alſo be conſidered, that upon the due and natural ſtate of the joint of the ancle, that is, upon the exact and proper diſpoſition of the tibia and fibula, both with regard to each other and to the aſtragalus, depend the juſt diſpoſition and proper action

of

To face page 59.





of ſeveral other muſcles of the foot and toes; ſuch as the gaſtrocnemii, the tibialis anticus, and poſticus, the flexor pollicis longus, and the flexor digitorum pedis longus, as muſt appear demonſtrably to any man who will firſt diſſect and then attentively conſider theſe parts.

If the tibia and fibula be both broken, they are both generally diſplaced in ſuch manner, that the inferior extremity, or that connected with the foot, is drawn under that part of the fractured bone which is connected with the knee; making by this means a deformed, unequal tumefaction in the fractured part, and rendering the broken limb ſhorter than it ought to be, or than its fellow. And this is generally the caſe, let the fracture be in what part of the leg it may.

If the tibia only be broken, and no act of violence, indiſcretion, or inadvertence be committed, either on the part of the patient or of thoſe who conduct him, the limb moſt commonly preſerves its figure and length; the ſame thing generally happens if the fibula only be broken, in all that part of it, which is ſuperior to letter *A* in the annexed figure, or in any part of it be-

tween

tween its upper extremity, and within two or three inches of its lower one.

I have already ſaid, and it will obviouſly appear to every one who examines it, that the ſupport of the body and the due and proper uſe and execution of the office of the joint of the ancle depend almoſt entirely on the perpendicular bearing of the tibia upon the aſtragalus, and on its firm connection with the fibula. If either of theſe be perverted or prevented, ſo that the former bone is forced from its juſt and perpendicular poſition on the aſtragalus, or if it be ſeparated by violence from its connection with the latter, the joint of the ancle will ſuffer a partial diſlocation internally *; which partial diſlocation cannot happen without not only a conſiderable extenſion, or perhaps laceration of the burſal ligament of the joint, which is lax and weak, but a laceration of thoſe ſtrong tendinous ligaments, which connect the lower end of the tibia with the aſtragalus and os calcis, and which conſtitute in great meaſure the ligamentous ſtrength of the joint of the ancle.

This

* See the figure at the preceding page.

This is the caſe, when by leaping or jumping the fibula breaks in the weak part already mentioned, that is, within two or three inches of its lower extremity. When this happens, the inferior fractured end of the fibula falls inward toward the tibia, that extremity of the bone which forms the outer ancle is turned ſomewhat outward and upward, and the tibia having loſt its proper ſupport, and not being of itſelf capable of ſteadily preſerving its true perpendicular bearing, is forced off from the aſtragulus inwards, by which means the weak burſal, or common ligament of the joint is violently ſtretched, if not torn, and the ſtrong ones, which faſten the tibia to the aſtragalus and os calcis, are always lacerated, thus producing at the ſame time a perfect fracture and a partial diſlocation, to which is ſometimes added a wound in the integuments, made by the bone at the inner ancle. By this means, and indeed as a neceſſary conſequence, all the tendons which paſs behind or under, or are attached to the extremities of the tibia and fibula, or os calcis, have their natural direction and diſpoſition ſo altered, that inſtead of performing their appointed actions, they all contri-

bute

bute to the diſtortion of the foot, and that by turning it outward and upward.

When this accident is accompanied, as it ſometimes is, with a wound of the integuments of the inner ancle, and that made by the protruſion of the bone, it not infrequently ends in a fatal gangrene, unleſs prevented by timely amputation, though I have ſeveral times ſeen it do very well without. But in its moſt ſimple ſtate, unaccompanied with any wound, it is extremely troubleſome to put to rights, ſtill more ſo to keep it in order, and unleſs managed with addreſs and ſkill, is very frequently productive both of lameneſs and deformity ever after.

After what has been ſaid, a farther explanation why this is ſo, is unneceſſary. Whoever will take even a curſory view of the diſpoſition of the parts, will ſee that it muſt be ſo. By the fracture of the fibula, the dilatation of the burſal ligament of the joint, and the rupture of thoſe which ſhould tie the end of the tibia firmly to the aſtragalus and os calcis, the perpendicular bearing of the tibia on the aſtragalus is loſt, and the foot becomes diſtorted; by this diſtortion the direction and action of all the muſcles already recited are ſo altered, that it

becomes

becomes (in the uſual way of treating this caſe) a difficult matter to reduce the joint, and, the ſupport of the fibula being gone, a more difficult one to keep it in its place after reduction. If it be attempted with compreſs and ſtrict bandage, the conſequence often is a very troubleſome as well as painful ulceration of the inner ancle, which very ulceration becomes itſelf a reaſon why ſuch kind of preſſure and bandage can be no longer continued; and if the bone be not kept in its place, the lameneſs and deformity are ſuch, as to be very fatiguing to the patient, and to oblige him to wear a ſhoe with an iron, or a laced buſkin, or ſomething of that ſort, for a great while, or perhaps for life.

All this trouble, pain, difficulty, and inconvenience, are occaſioned by putting and keeping the limb in ſuch poſition, as neceſſarily puts the muſcles into action, or into a ſtate of reſiſtance, which in this caſe is the ſame. This occaſions the difficulty in reduction, and the difficulty in keeping it reduced; this diſtorts the foot, and by pulling it outward and upward makes that deformity, which always accompanies ſuch accident; but if the poſition of the limb

be

be changed, if by laying it on its outſide with the knee moderately bent, the muſcles forming the calf of the leg, and thoſe which paſs behind the fibula and under the os calcis, are all put into a ſtate of relaxation and non-reſiſtance, all this difficulty and trouble do in general vaniſh immediately; the foot may eaſily be placed right, the joint reduced, and by maintaining the ſame diſpoſition of the limb, every thing will in general ſucceed very happily, as I have many times experienced.

Two kinds of fracture there are, and only two that I can recollect (relative to the limbs) which do not admit of the bent poſition of the joints, I mean that of the proceſſus olecranon at the elbow, and that of the patella; in theſe a ſtraight poſition of the arm and leg is neceſſary, in the former to keep the fractured parts in contact till they are united, in the latter, to bring them as near to each other as may beſt ſerve the purpoſe of walking afterward *.

With

* Although a ſtraight poſition of the limb is neceſſary for the broken patella, yet this very poſition becomes ſo upon the ſame principle, as renders the bent poſture moſt advantageous in the broken tibia and femur, viz. the relaxation

With regard to the fracture of the patella, an opinion has long and generally prevailed, which ſeems to me to have no foundation in truth, or (when duly conſidered) even in probability; it is, that the great degree of ſtiffneſs in the joint of the knee, which is ſometimes found to be the conſequence of this kind of fracture, is owing to,

laxation of the muſcles and tendons attached to the fractured bone.

Whoever will for a moment attend to the diſpoſition of the pieces in a patella, which has been broken tranſverſely, will ſee how little neceſſary or uſeful the many contrivances of bandages, ſtraps, compreſſes, buckles, buttons, &c. to be found in writers are, eſpecially all that part of them which are applied to the inferior fragment.

By the action of the united tendons of the extenſores muſcles of the leg, the ſuperior fragment is pulled upward and ſeparated from the inferior, but the latter remains nearly, if not abſolutely, where it was before the accident; there is nothing to act upon it, and therefore it cannot, nor does it move.

The extenſion of the leg puts the muſcles attached to the upper part of the broken bone into a ſtate of relaxation, and prevents their acting; and though a ſmall compreſs juſt above this piece, with a moderate bandage, may be uſeful toward retaining it, yet it is the poſition of the leg which muſt keep the broken piece down, and effect the cure.

to, or produced by, a quantity of callus falling into it from the edges of the broken bone, and that the nearer the broken pieces are brought to each other, the more likely ſuch conſequence is.

Every part of this doctrine ſeems equally abſurd. In the firſt place, the fractured bone is by no means capable of ſupplying ſuch a quantity of callus as to produce this end, unleſs it may be ſuppoſed to run from it as ſolder from a plumber's ladle; in the ſecond place, if this was the caſe, the moſt likely, and indeed the only probable way of preventing the depoſition of ſuch juice, muſt be by bringing the broken pieces into cloſe contact; and in the third place, there is no authority from the appearance of ſuch joints after death, (at leaſt as far as my experience goes) to ſuppoſe this to be the caſe, or to countenance ſuch opinion. The cauſe therefore of this rigidity, which is now and then found to attend the broken patella, muſt be ſought for elſewhere, viz. in the long reſt and confinement of the joint, as a means uſed by many to procure exact union; in miſchief done to the ligament, which is formed by the united tendons of

the

the four extenſor muſcles of the leg, at the time of and by the fracture; and in the nature of the fracture itſelf, that is, the manner in which the bone ſhall happen to be broken.

But, be all this as it may, the fact undoubtedly is, that they walk beſt after ſuch accident, whoſe patella has been broken tranſverſely, and that into two nearly equal fragments; whoſe confinement to the bed has been ſhort, that is, no longer than while the inflammation laſted; whoſe knee, after ſuch period, has been daily and moderately moved; and in whom the broken pieces are not brought into exact contact, but lie at ſome ſmall diſtance from each other.

I cannot take leave of this ſubject of ſimple fractures, without mentioning a circumſtance relative to them, which although, when rightly underſtood, is of little or no importance, yet by being miſunderſtood, becomes frequently of conſiderable conſequence.

I mean, the uſe of the term, *riſing end of a broken bone.*

By the expreſſion, any one unacquainted with theſe things would be inclined to

think, that the prominent part of a broken bone roſe, or was elevated from its natural place, and became by ſuch riſing ſuperior to the other part or extremity of the fracture. This would certainly be the idea of an ignorant perſon, and as ſuch would be of little conſequence; but by the practice of many, who call themſelves ſurgeons, it is as certainly their idea alſo, and this renders it a matter of great conſequence. Many inſtances are producible, in which our conduct is in great meaſure regulated by the language which we uſe. Having no ideas annexed to our words leads us into abſurdity and unintelligibility, but falſe ones influence us ſtill more, and frequently produce very material errors.

The fiſtula lachrymalis, the fiſtula in perinæo, and that in ano, are glaring proofs of this, and my preſent ſubject is full as much ſo: for upon the erroneous idea annexed to the term *riſing end*, ſtands all the abſurd practice of compreſs, bolſter, and ſtrict bandage in the caſes of ſimple fracture *.

The

* I was ſome few years ago carried by a ſurgeon, ſince dead, to ſee a contrivance of his own to keep down the riſing

The truth is, that there is really no *riſing end* to a broken bone; I mean, when applied, as the term uſually is, to the leg, thigh and clavicle. There is indeed a ſuperior or prominent end or part, and an inferior or depreſſed one, but the former of theſe is in its proper place, from which it cannot by art be moved, and the latter, which is not in its proper place, is very capable by art of being put into it.

Perhaps this may to ſome appear a mere play of words, a nominal diſtinction without a real difference; but when the influence, which a right or wrong idea of this produces on practice is attended to, the conſequence will be obvious and ſerious.

When a collar bone, os femoris, or tibia and fibula are broken, by the action of the muſcles, by the motions of the patient, and by the mere weight of the inferior part of the arm, thigh or leg, the fractured

 ends

riſing end of a broken tibia. It was ſomewhat upon the principle of Petit's tourniquet, and calculated to act by compreſſion. I told him my opinion freely, but the inventor was wedded to his invention, and the firſt ſimple fracture he applied it to, he thereby converted into a compound one, by preſſing the bone through the ſkin.

ends of ſuch bones are diſplaced, and always diſplaced in ſuch manner, that the inequality occaſioned neceſſarily by ſuch diſplacement, proceeds from the inferior end of the fractured bone being retracted or drawn under the ſuperior: this produces a tumefaction or unequal riſing, and the upper extremity of the fracture is therefore called the riſing end of it. Now the man who regards this riſing end, as that part of the fracture which has by ſuch riſing got out of its place, and not as having accidentally become the prominent part merely by the inſinuation or retraction of the other part underneath it, will go to work with bolſter, compreſs and bandage, in order to bring and keep ſuch end down; by which means he will give his patient conſiderable pain, and while he depends on ſuch means alone, will moſt certainly be fruſtrated in his intention and expectation, the means not being adequate to the propoſed end. But the man who looks on this in the true light, that is, who looks on the ſuperior part, as being in its proper place, and the inferior, as being diſplaced by the weight of the limb, and the action of the muſ-

cles, will know, that by the mere poſition of ſuch limb, he ſhall be able to remedy all the inconvenience and deformity, as far as they are by art capable of remedy, without the parade, or the fatigue of uſeleſs apparatus.

He will, for example, know that the prominent part of a broken clavicle, that part of it which is next to the ſternum, is juſt where it ſhould be, and that the inferior part, that which is connected with the ſcapula, is out of its place, by being drawn down by the weight of the arm; and therefore inſtead of loading, as is uſual, the prominent part with quantities of compreſs, which never can do any ſervice, he, by a proper elevation of the arm, will bring the lower end upward into contact with the other, and thereby with very little trouble eaſily accompliſh what he never can do in any other manner, however operoſe.

The ſame thing will happen from the ſame principles in the leg and thigh; a prominence, or a riſing end, there always will be, but that riſing end is never to be brought down by any preſſure from compreſs or bandage; the fallen or inferior one muſt always

be brought up to it, by the proper poſition of the reſt of the limb: this will always remove the inequality as far as it is removeable, and nothing elſe can *.

* In a profeſt regular treatiſe on this ſubject, it would be right to take notice of what may be called the infortunia or accidental evils, which ſometimes accompany even ſimple fractures; ſuch are, diſeaſe ariſing from injury done to the medullary membrane, within the bones, in bad habits: hæmorrhage, or a ſpecies of ſpurious aneuriſm, from a wound of the interoſſeal artery, between the tibia and fibula, or of either of the carpal arteries: miſchief from the fracture becoming accidentally the ſeat of the criſis of a fever, deficiency of callus, or the accident of the broken bone not uniting: the fractured limb becoming the ſeat of an eryſipelas, terminating in a ſlough of the common membrane and perioſteum: the gelatinous juice or callus, which ſhould unite the fracture, being in ſo morbid a ſtate, as to produce a kind of caries with exoſtoſis, inſtead of its doing its proper duty, &c. Of all theſe there are examples, but they do not come within the plan which I preſcribed to myſelf when I began theſe papers.

COM-

COMPOUND FRACTURES.

I USE the term compound fracture in the ſenſe in which the Engliſh have always uſed it, that is, to imply a broken bone complicated with a wound.

In this kind of caſe the firſt object of conſideration is, whether the preſervation of the fractured limb can, with ſafety to the patient's life, be attemped; or, in other words, whether the probable chance of deſtruction, from the nature and circumſtances of the accident, is not greater than it would be from the operation of amputation. Many things may concur to make this the caſe. The bone or bones being broken into many different pieces, and that for a conſiderable extent, as happens from broad wheels, or other heavy bodies of large ſurface, paſſing over, or falling on ſuch limbs; the ſkin, muſcles, tendons, &c. being ſo torn,

torn, lacerated and deſtroyed, as to render gangrene and mortification the moſt probable and moſt immediate conſequence; the extremities of the bones forming a joint being cruſhed, or as it were comminuted, and the ligaments connecting ſuch bones being torn and ſpoiled, are, among others, ſufficient reaſons for propoſing and for performing immediate amputation. Reaſons, which (notwithſtanding any thing that may have been ſaid to the contrary) long and reiterated experience has approved, and which are vindicable upon every principle of humanity, or chirurgic knowledge.

When a ſurgeon ſays, that a limb, which has juſt ſuffered a particular kind of compound fracture, ought rather to be immediately cut off, than that any attempt ſhould be made for its preſervation, he does not mean by ſo ſaying, that it is abſolutely impoſſible for ſuch limb to be preſerved at all events; he is not to be ſuppoſed to mean ſo much in general, though ſometimes even that will be obvious; all that he can truly and juſtly mean is, that from the experience of all time it has been found, that the attempts to preſerve limbs ſo circumſtanced, have moſt frequently been fruſtrated by the

death

death of the patients, in conſequence of ſuch injury; and that from the ſame experience it has been found, that the chance of death from amputation is by no means equal to that ariſing from ſuch kind of fracture.

Every man knows, that apparently deſperate caſes are ſometimes cured; and that limbs ſo ſhattered and wounded, as to render amputation the only *probable* means for the preſervation of life, are now and then ſaved. This is an uncontroverted fact, but a fact which proves very little againſt the common opinion; becauſe every man of experience alſo knows, that ſuch eſcapes are very rare, much too rare to admit of being made precedents, and that the majority of ſuch attempts fail.*

This

* The baron Van Swieten, writing as many others have done, that is, theoretically on ſurgery, adviſes us, in the caſe of very bad compound fractures, which may moſt probably require amputation, to defer the operation, until we have tried the force of antiſeptic fomentations and applications of like kind for two or three days; and this opinion and advice he builds, in ſome meaſure, on a remarkable ſucceſs of La Motte, in a ſeemingly deſperate caſe, of a man's leg maſhed by the wheel of a heavy carriage.

That De La Motte's patient eſcaped, I make no doubt, becauſe he has ſaid ſo; but the ſurgeon ſhewed much

more

This conſideration relative to amputation is of the more importance, becauſe it moſt frequently requires immediate determination; every minute of delay is in many inſtances to the patient's diſadvantage, and a very ſhort ſpace of time indeed, frequently makes all the difference between probable ſafety and fatality. If theſe caſes in general would admit of deliberation for two or three days, and during that time ſuch circumſtances might be expected to ariſe, as ought neceſſarily to determine the ſurgeon in his conduct, without adding to the patient's hazard, the difference would be conſiderable; the former would not ſeem to be ſo precipitate in his determination; as he is frequently thought to be, and the latter being more convinced of the

more raſhneſs in attempting to ſave ſuch a limb, than he would have done in the amputation of it; the operation would have been the more juſtifiable practice.—With regard to the baron's advice, to ſtay two or three days, I take the liberty to add, that if you do that, ſtay ſeveral more; for at the end of that time (I mean two or three days) the patient will have very little chance indeed from the operation, much leſs than he would have had at the time of the accident.

I ſhould be very ſorry to be thought a patron or an adviſer of raſhneſs or cruelty; but in what I have here ſaid, I believe I ſhall have every man in the profeſſion, who

the neceſſity, would ſubmit to it with leſs reluctance. But unhappily for both parties, this is ſeldom the caſe; and the firſt opportunity having been neglected or not embraced, we are very frequently denied another. Here therefore the whole exertion of a man's judgment is required, that he may neither raſhly and unneceſſarily deprive his patient of a limb, nor through a falſe tenderneſs or timidity, ſuffer him to periſh, by endeavouring to preſerve ſuch limb. Some degree of addreſs is alſo neceſſary upon ſuch occaſion, in order to convince the patient, that what ſeems to be determined upon haſtily and with precipitation, will not ſafely admit of longer deliberation.

The limb being thought capable of preſervation, the next conſideration is the reduction of the fracture. The eaſe or difficulty attending this depends, not only on the general nature of the caſe, but on the particular diſpoſition of the bone with regard to the wound.

If the bone be not protruded forth, the trouble of reducing, and of placing the fracture in a good poſition, will be much leſs,

who has either true humanity or ſound judgment founded on experience, on my ſide.

leſs, than if the caſe be otherwiſe; and in the caſe of protruſion or thruſting forth of the bone or bones, the difficulty is always in proportion to the comparative ſize of the wound, through which ſuch bone has paſſed. In a compound fracture of the leg or thigh, it is always the upper part of the broken bone which is thruſt forth. If the fracture be of the tranſverſe kind, and the wound large, a moderate degree of extenſion will in general eaſily reduce it; but if the fracture be oblique, and terminates, as it often does, in a long ſharp point, this point very often makes its way through a wound no larger than juſt to permit ſuch extenſion. In this caſe, the very placing the leg in a ſtraight poſition, in order to make extenſion, obliges the wound or orifice to gird the bone tight, and makes all that part of it, which is out of ſuch wound, preſs hard on the ſkin of the leg underneath it. In theſe circumſtances, all attempts for reduction in this manner will be found to be impracticable; the more the leg is ſtretched out, the tighter the bone will be begirt by the wound, and the more it will preſs on the ſkin underneath.

Upon this occaſion, it is not very unuſual to have recourſe to the ſaw, and by

that

that means to remove a portion of the protruded bone.

I will not ſay that this is always or abſolutely unneceſſary or wrong, but it moſt certainly is frequently ſo. In ſome few inſtances, and in the caſe of extreme ſharp-pointedneſs of the extremity of the bone, it may be, and undoubtedly is right: but in many inſtances it is totally unneceſſary.

The two moſt proper means of overcoming this difficulty are, change of poſture of the limb, and enlargement of the wound. In many caſes the former of theſe under proper conduct will be found fully ſufficient, and where it fails, the latter ſhould always be made uſe of. Whoever will attend to the effect, which putting the leg or thigh (having a compound fracture and protruded bone) into a ſtraight poſition always produces; that is, to the manner in which the wound in ſuch poſition girds the bone, and to the increaſed difficulty of reduction thereby induced, and will then, by changing the poſture of ſuch limb from an extended one, to one moderately bent, obſerve the alteration thereby made, in both the juſt-mentioned circumſtances, will be ſatisfied of the truth of what I have ſaid,

and

and of the much greater degree of eaſe and practicability of reduction in the bent, than in the extended poſition, that is, in the relaxed, than in the ſtretched ſtate of the muſcles. Reduction being found impracticable, either by extenſion or change of poſture, the obvious and neceſſary remedy for this difficulty is enlargement of the wound. This to ſome practitioners, who have not ſeen much of this buſineſs, appears a diſagreeable circumſtance, and therefore they endeavour to avoid it; but their apprehenſions are in general groundleſs and ill-founded; in enlarging the wound there is neither difficulty nor danger, it is the ſkin only which can require diviſion, and in making ſuch wound there can be no poſſible hazard. It is needleſs to ſay that the diviſion ſhould be ſuch as to render reduction eaſy; or to remind the practitioner, that ſuch enlarged opening may ſerve very good future purpoſes, by making way for the extraction of fragments, and the diſcharge of matter, ſloughs, &c.

If the bone be broken into ſeveral pieces, and any of them be either totally ſeparated, ſo as to lie looſe in the wound, or if they be ſo looſened and detached as to ren-

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der their union highly improbable, all ſuch pieces ought to be taken away; but they ſhould be removed with all poſſible gentleneſs, without pain, violence or laceration, without the riſque of hæmorrhage, and with as little poking into the wound as poſſible. If the extremities of the bone be broken into ſharp points, which points wound and irritate the ſurrounding parts, they muſt be removed alſo. But the whole of this part of the treatment of a compound fracture ſhould be executed with great caution; and the practitioner ſhould remember, that if the parts ſurrounding the fracture be violated, that is, be torn, irritated, and ſo diſturbed as to excite great pain, high inflammation, &c. it is exactly the ſame thing to the patient and to the event of the caſe, whether ſuch violence be the neceſſary conſequence of the fracture, or of his unneceſſary, and awkward manner of poking into and diſturbing the wound. The great objects of fear and apprehenſion in a compound fracture (that is, in the firſt or early ſtate of it) are, pain, irritation and inflammation; theſe are to be avoided, prevented, and appeaſed by all poſſible means, let every thing elſe be as it may; and al-

though certain things are always recited, as neceſſary to be done, ſuch as removal of fragments of bone, of foreign bodies, &c. &c. &c. yet it is always to be underſtood, that ſuch acts may be performed without prejudicial or great violence, and without adding at all to the riſque or hazard neceſſarily incurred by the diſeaſe.

Reduction of or ſetting a compound fracture is the ſame as in the ſimple, that is, the intention in both is the ſame, viz. by means of a proper degree of extenſion to obtain as apt a poſition of the ends of the fracture with regard to each other, as the nature of the caſe will admit, and thereby to produce as perfect and as ſpeedy union as poſſible.

To repeat in this place what has already been ſaid under the head of extenſion would be tedious and unneceſſary. If the arguments there uſed for making extenſion, with the limb ſo moderately bent as to relax the muſcles, and take off their power of reſiſtance, have any force at all, they muſt have much more, when applied to the preſent caſe: if it be allowed to be found very painful to extend, or to put or keep on the ſtretch, muſcles which are not at all or but

ſlightly

ſlightly wounded, and only liable in ſuch extenſion to be pricked and irritated, it is ſelf-evident that it muſt be much more ſo when the ſame parts are torn and wounded conſiderably; when the ends of the fractured bone have made their way quite through them, divided the ſkin, and laid all open to the acceſs of the air.

Every conſequence which does or may be ſuppoſed to flow from wound, pain or irritation, in conſequence of violence, muſt neceſſarily be much greater, when a lacerated wound, and that made by the bone, is added to the fracture; not to mention the ills ariſing from extending or ſtretching out muſcles already torn or half divided.

One moment's reflection muſt be ſufficient to convince any reaſonable man: but experience is the only proper teſt of all theſe kinds of things. Let this method of treatment then, be fairly and properly ſubjected to it; and if the great advantage of the one over the other does not appear, that is, if the leſs ſenſation of pain by the patient, and the more happy, more perfect, and more expeditious accompliſhment of his purpoſe by the ſurgeon, do not determine greatly in favour of relaxed poſition, I am, and have

for a conſiderable length of time been, greatly miſtaken.

The wound dilated, (if neceſſary) looſe pieces removed, (if there were any) and the fracture reduced, and placed in the beſt poſſible poſition, the next thing to be done is to apply a dreſſing.

On this ſubject a great deal has been ſaid by writers, particularly by ſuch of them as have implicit faith in external applications; but, in order to be able to execute this part of the proceſs properly, a man has only to aſk himſelf, What are the intentions which, by any kind of dreſſing to a compound fracture, he means to aim at the accompliſhment of? And a rational anſwer to this will give him all that he can want to know.

The dreſſing neceſſary in a compound fracture is of two kinds, viz. that for the wound, and that for the limb. By the former, we mean to maintain a proper opening for the eaſy and free diſcharge of gleet, ſloughs, matter, extraneous bodies, or fragments of bone, and this in ſuch manner, and by ſuch means, as ſhall give the leaſt poſſible pain or fatigue, ſhall neither irritate by its qualities, nor oppreſs by its quantity, nor by any means contribute to the deten-

tion

tion or lodgment of what ought to be diſcharged. By the latter, our aim ſhould be the prevention or removal of inflammation, in order, if the habit be good, and all other circumſtances fortunate, that the wound may be healed, by what the ſurgeons call the firſt intention, that is, without ſuppuration or abſceſs; or that not being practicable, that gangrene and mortification, or even very large ſuppuration may be prevented, and ſuch a moderate and kindly degree of it eſtabliſhed, as may beſt ſerve the purpoſe of a cure. The firſt therefore, or the dreſſing for the wound, can conſiſt of nothing better or indeed ſo good, as ſoft dry lint, laid on ſo lightly as juſt to abſorb the ſanies, but neither to diſtend the wound, nor be the ſmalleſt impediment or obſtruction to the diſcharge of matter. This lint ſhould be kept clear of the edges, and the whole of it ſhould be covered with a pledgit ſpread with a ſoft eaſy digeſtive. The times of dreſſing muſt be determined by the nature of the caſe; if the diſcharge be ſmall or moderate, once in twenty-four hours will be ſufficient; but if it be large, more frequent dreſſing will be neceſſary, as well to prevent offence, as to remedy the

inconveniences ariſing from a great diſcharge of an irritating ſharp ſanies.

The method of treating the limb, with a view to the prevention of ſuch accidents and ſymptoms, as pain, inflammation, and laceration of parts are likely to produce, is different with different practitioners; ſome uſing from the very firſt, relaxing, greaſy applications, others applying medicines of very different nature. Both theſe may be right conditionally, that is, according to different circumſtances in the caſe, but they cannot be equally ſo in the ſame circumſtances.

Many practitioners are accuſtomed to envelope compound fractures in a ſoft warm relaxing cataplaſm from the very firſt; whether the limb be in a tenſe ſwollen ſtate or not. This, if I may take the liberty of ſaying ſo, appears to me to be injudicious. When from neglect, from length of time paſſed without aſſiſtance, from miſconduct or drunkenneſs in the patient, from aukwardneſs and unhandineſs in the aſſiſtants, or from any other cauſe a tenſion has taken poſſeſſion of the limb, and it is become tumid, ſwollen and painful, a warm cataplaſm is certainly the beſt and moſt proper appli-

cation

cation that can be made, and that for very obvious reaſons; the ſtate of the parts under theſe circumſtances is ſuch, that immediate union is impoſſible, and nothing but a free and plentiful ſuppuration can diſſipate or remove impending miſchief: every thing therefore which can tend toward relaxing the tenſe, ſwollen, and irritable ſtate of the parts concerned, muſt neceſſarily be right; the one thing aimed at, (plentiful ſuppuration) cannot be accompliſhed without it. But when the parts are not in this ſtate, the intention ſeems to be very different. To relax ſwollen parts, and to appeaſe pain and irritation by ſuch relaxation, is one thing; to prevent inflammatory defluxion and tumefaction is certainly another; and they ought to be aimed at by very different means. In the former, a large ſuppuration is a neceſſary circumſtance of relief, and the great means of cure; in the latter it is not, and a very moderate degree of it is all that is required. The warm cataplaſm therefore, although it be the beſt application that can be made uſe of in the one caſe, is certainly not ſo proper in the other, as applications of a more diſcutient kind, ſuch as mixtures of ſpirit. vini,

vinegar and water, with crude ſal ammoniac, ſpirit. Mindereri, acet. litharg. and medicines of this claſs, in whatever form the ſurgeon may chuſe. By theſe, in good habits, in fortunately-circumſtanced caſes, and with the aſſiſtance of what ſhould never be neglected, I mean phlebotomy, and the general antiphlogiſtic regimen, inflammation may ſometimes be kept off, and a cure accompliſhed, without large collections or diſcharges of matter, or that conſiderable degree of ſuppuration, which though neceſſary in ſome caſes, and almoſt unavoidable in others, are and muſt be rather promoted and encouraged than retarded or prevented, by warm relaxing applications of the pultice kind.

Compound fractures in general require to be dreſſed every day, and the wounded parts not admitting the ſmalleſt degree of motion without great pain, perfect quietude becomes as neceſſary as frequent dreſſing.

The common bandage therefore (the roller) has always in this caſe been laid aſide, and what is called the eighteen-tailed bandage ſubſtituted, very judiciouſly, in its place. Of this I have already ſpoken ſo largely, as to make repetition unneceſſary.

Splints,

Splints, that is, ſuch ſhort ones as are moſt commonly made uſe of in ſimple fractures, are by all forbid in the compound, and that for the ſame reaſon which ought to have prevented them from having ever been uſed in the former, viz. becauſe the probable good to be derived from them can be but little, and the probable miſchief is obvious and conſiderable.

But although ſhort ſplints are for many reaſons palpably improper in both caſes, yet thoſe of proper length, thoſe which reach from joint to joint, comprehend them both, and, applied on each ſide of the leg only, are very uſeful both in the ſimple and in the compound fracture, as they may, thus applied, be made to keep the limb, more conſtantly ſteady and quiet, than it can be kept without them.

With regard to poſition of the limb, I have already been ſo explicit, when ſpeaking of the ſimple fracture, that to ſay any thing more about it here would be an abuſe of the reader's time and patience. The only, or the material difference between a ſimple and a compound fracture, as far as relates to this part of the treatment, is, that as the parts ſurrounding the broken

bone

bone in the latter are more injured, and conſequently more liable to irritation, pain, inflammation, and all their conſequences, therefore every method and means, by which the alleviation of ſuch ſymptoms, and the prevention of ſuch conſequences can be obtained, is ſtill more neceſſary and requiſite. Among theſe the poſture of the limb is ſo principal a circumſtance, that without its concurrence every other will be fruitleſs. The points to be aimed at are, the even poſition of the broken parts of the bone, and ſuch diſpoſition of the muſcles ſurrounding them, as is moſt ſuitable to their wounded, lacerated ſtate, as ſhall be leaſt likely to irritate them, by keeping them on the ſtretch, or to produce high inflammation, and at beſt large ſuppuration. Theſe, I ſay, are the ends to be purſued; and how much the poſition of the limb does, and muſt neceſſarily contribute to the advantage or diſadvantage juſt recited, muſt be ſo obvious to any body capable of reflexion, that nothing more need be ſaid about it.

At the beginning of theſe ſheets, I have ſaid, that it was not my intention to write a regular treatiſe, but only to throw out a few hints,

hints, which I hoped might prove uſeful to ſuch as have not yet received better information. The part of my ſubject at which I am now arrived, does not indeed admit of much more: a few general precepts are all which a writer can give; the particular method of conducting each particular caſe, muſt be determined by the nature of that caſe, and by the judgment of the ſurgeon.

Every body knows, or ought to know, that theſe caſes, of all others, require at firſt the moſt rigid obſervance of the antiphlogiſtic regimen; that pain is to be appeaſed and reſt obtained, by anodynes; that inflammation is to be prevented or removed, by free and frequent bleeding, by keeping the body open, and by the adminiſtration of ſuch medicines as are beſt known to ſerve ſuch purpoſes.---And that, during this firſt ſtate or ſtage, the treatment of the limb muſt be calculated, either for the prevention of inflammatory tumefaction, by ſuch applications as are in general known by the title of diſcutients; or, ſuch tumor and tenſion having already taken poſſeſſion of the limb, that warm fomentation, and relaxing and emollient medicines are required.

If theſe, according to the particular exigence of the caſe, prove ſucceſsful, the conſequence is, either a quiet eaſy wound, which ſuppurates very moderately, and gives little or no trouble; or a wound, attended at firſt with conſiderable inflammation, and that producing large ſuppuration with great diſcharge and troubleſome formation and lodgment of matter. If on the other hand our attempts do not ſucceed, the conſequence is gangrene and mortification.

Theſe are the three general events or terminations of a compound fracture; and according to theſe muſt the ſurgeon's conduct be regulated.

In the firſt inſtance, he has indeed nothing to do but to avoid doing miſchief, either by his manner of dreſſing, or by diſturbing the limb. Nature let alone will accompliſh her own purpoſe; and art has little more to do than to preſerve the due poſition of the limb, and to take care that the dreſſing applied to the wound proves no impediment.

In the ſecond ſtage, that of formation and lodgment of matter, in conſequence of large ſuppuration, all a ſurgeon's judgment will ſometimes be required in the treatment

both

both of the patient and his injured limb. Inlargement of the preſent wound, for the more convenient diſcharge of matter *; new or counter-openings for the ſame purpoſe, or for the extraction of fragments of broken or exfoliated bone, will very frequently be found neceſſary, and muſt be executed. In the doing this, care muſt be taken that what is requiſite be done and no more, and that ſuch requiſite operations be performed with as little diſturbance and pain as poſſible; the manner of doing buſineſs of this kind, will make a very material difference in the ſufferings of the patient.

Very contrary, or at leaſt very different intentions, ſeem to me to require the ſurgeon's very particular attention in the two parts of this ſtage of the diſeaſe.

Previous

* It is a practice with ſome, from a timidity in uſing a knife, to make uſe of bolſters and plaſter-compreſſes for the diſcharge of lodging matter. Where another, or a counter-opening can conveniently and ſafely be made, it is always preferable; the compreſs ſometimes acting diametrically oppoſite to the intention with which it is applied, and contributing to the lodgment by confining the matter; beſide which, it requires a greater degree of preſſure to make it efficacious, than a limb in ſuch circumſtances generally can bear.

Previous to large ſuppuration, or conſiderable collections and lodgments of matter, tumefaction, induration, and high inflammation, attended with pain, irritation, and fever, require evacuation by phlebotomy, an open belly, and antiphlogiſtic remedies, as well as the free uſe of anodynes, and ſuch applications to the limb as may moſt ſerve the purpoſe of relaxation. But the matter having been formed and let out, and the pain, fever, &c. which were ſymptomatic thereof, having diſappeared or ceaſed, the uſe and purpoſe of ſuch medicines and ſuch applications ceaſes alſo, and they ought therefore to be diſcontinued. By evacuation, &c. the patient's ſtrength has neceſſarily (and indeed properly) been reduced; by cataplaſm, &c. the parts have been ſo relaxed as to procure an abatement or ceſſation of inflammation, a ſubſidence of tumefaction, and the eſtabliſhment of a free ſuppuration; but theſe ends once fairly and fully anſwered, another intention ariſes, which regards the ſafety and well-doing of the patient, nearly, if not full as much as the former, which intention will be neceſſarily fruſtrated by purſuing the method hitherto followed. The patient now will re-

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quire refection and ſupport, as much as he before ſtood in need of reduction; and the limb, whoſe indurated and inflamed ſtate hitherto required the emollient and relaxing pultice, will now be hurt by ſuch kind of application, and ſtand in need of ſuch as are endued with contrary qualities, or at leaſt ſuch as ſhall not continue to relax. Good light eaſily-digeſted nutriment, and the Peruvian bark, will beſt anſwer the purpoſe of internals; the diſcontinuation of the cataplaſms, and the application of medicines of the corroborating kind, are as neceſſary with regard to externals *.

In ſhort, if there be any rationale in the uſe of the cataplaſm in the firſt ſtage, its impropriety in the ſecond muſt be evident from the ſame principles. So alſo with regard to evacuation, and the antiphlogiſtic regimen,

* It is ſurpriſing how large and how diſagreeable a diſcharge will be made for a conſiderable length of time, in ſome inſtances, from the detenſion and irritation of a ſplinter of bone. If therefore ſuch diſcharge be made, and there be neither ſinus nor lodgment to account for it, and all other circumſtances are favourable, examination ſhould always be made, in order to know whether ſuch cauſe does not exiſt, and if it does, it muſt be gently and carefully removed.

regimen, when all the good propoſed to be obtained by them has been received, a purſuit of the ſame method muſt become injurious, and that for the ſame reaſon why it was before neceſſary and beneficial.

A non-attention to this, has, I believe, been not infrequently the cauſe of the loſs both of limbs and lives.

Every body who is acquainted with ſurgery knows, that in the caſe of a bad compound fracture, attended with large ſuppuration, it ſometimes happens, even under the beſt and moſt judicious treatment, that the diſcharge becomes too great for the patient to ſuſtain, and that after all the fatigue, pain and diſcipline, which he has undergone, it becomes neceſſary to compound for life by the loſs of the limb *. This, I ſay, does ſometimes happen under the beſt and moſt rational treatment; but I am

* There is one circumſtance relative to compound fractures, which perhaps may be deemed worth notice; which is, that I do not remember ever to have ſeen it neceſſary to amputate a limb for a compound fracture, on account of the too great diſcharge, in which the fracture had been united. In all thoſe caſes, where the operation has been found neceſſary on account of the drain, the fracture has always been perfectly looſe and diſunited.

am convinced that it alſo is now and then the conſequence of purſuing the reducing, the antiphlogiſtic, and the relaxing plan too far. I would therefore take the liberty ſeriouſly to adviſe the young practitioner, to attend diligently to his patient's pulſe and general ſtate, as well as to that of his fractured limb and wound; and when he finds all febrile complaint at an end, and all inflammatory tumour and hardneſs gone, that his patient is rather languid than feveriſh, that his pulſe is rather weak and low than hard and full, that his appetite begins to fail, and that he is inclined to ſweat or purge without aſſignable cauſe, and this in conſequence of a large diſcharge of matter from a limb which has ſuffered great inflammation, but which is now become rather ſoft and flabby than hard and tumid, that he will in ſuch circumſtances ſet about the ſupport of his patient, and the ſtrengthening of the diſeaſed limb *totis viribus*; in which I am from experience ſatisfied, he may often be ſucceſsful, where it may not be generally expected that he would. At leaſt he will have the ſatisfaction of having made a rational attempt; and if he is

obliged at laſt to have recourſe to amputation, he will perform it, and his patient will ſubmit to it, with leſs reluctance than if no ſuch trial had been made.

I have ſaid, that a compound fracture either unites and heals as it were by the firſt intention, which is the caſe of ſome of the lucky few, (and was my own;) or it is attended with high inflammation, multiplied abſceſſes and large ſuppuration, demanding all a ſurgeon's attention and ſkill; and even then ſometimes ending in the loſs of limb, or life, or both; or, that all our attempts prove fruitleſs from the firſt, and gangrene and mortification are the inevitable conſequence of the accident.

The two firſt I have already ſpoken to, the laſt only remains.

Gangrene and mortification are ſometimes the inevitable conſequences of the miſchief done to the limb at the time that the bone is broken; or they are the conſequences of the laceration of parts made by the mere protruſion of the ſaid bone.

They are alſo ſometimes the effect of improper or negligent treatment; of great violence uſed in making extenſion; of irrita-

tion

tion of the wounded parts, by poking after or in removing fragments or ſplinters of bone; of painful dreſſings; of improper diſpoſition of the limb, and of the neglect of phlebotomy, anodynes, evacuation, &c. Any, or all theſe, are capable either of inducing ſuch a ſtate of inflammation as ſhall end in a gangrene, or of permitting the inflammation, neceſſarily attendant upon ſuch accident, to terminate in the ſame event.

When ſuch accident or ſuch diſeaſe is the mere conſequence of the injury done to the limb, either at the time of or by the fracture, it generally makes its appearance very early; in which caſe alſo, its progreſs is generally too rapid for art to check. For theſe reaſons, when the miſchief ſeems to be of ſuch nature as that gangrene and mortification are moſt likely to enſue, no time can be ſpared, and the impending miſchief muſt either be ſubmitted to or prevented by early amputation. I have already ſaid, that a very few hours make all the difference between probable ſafety and deſtruction. If we wait till the diſeaſe has taken poſſeſſion of the limb, even in the

ſmalleſt degree, the operation will ſerve no purpoſe, but that of accelerating the patient's death. If we wait for an apparent alteration in the part, we ſhall have waited until all opportunity of being really ſerviceable is paſt. The diſeaſe takes poſſeſſion of the cellular membrane ſurrounding the large blood veſſels and nerves ſome time before it makes any appearance in the integuments, and will always be found to extend much higher in the former part, than its appearance in the latter ſeems to indicate. I have more than once ſeen the experiment made of amputating, after a gangrene has been begun, but I never ſaw it ſucceed, it has always haſtened the patient's deſtruction.

As far therefore as my experience will enable me to judge, or as I may from thence be permitted to dictate, I would adviſe that ſuch attempt ſhould never be made; but the firſt opportunity having been neglected or not embraced, all the power of the chirurgic art is to be employed in aſſiſting nature to ſeparate the diſeaſed part from the ſound; an attempt which now and then, under particular circumſtances,

has

has proved ſucceſsful, but which is ſo rarely ſo, as not to be much depended upon.

If the parts are ſo bruiſed and torn, that the circulation through them is rendered impracticable, or if the gangrene is the immediate effect of ſuch miſchief, the conſequence of omitting amputation, and of attempting to ſave the limb is, as I have already obſerved, moſt frequently very early deſtruction: but if the gangrenous miſchief be not merely and immediately the effect of the wounded ſtate of the parts, but of high inflammation, badneſs of general habit, improper diſpoſition of the limb, &c. it is ſometimes in our power ſo to alleviate, correct, and alter theſe cauſes, as to obtain a truce with the diſeaſe, and a ſeparation of the unſound parts from the ſound. The means whereby to accompliſh this end muſt, in the nature of things, be varied according to the producing cauſes or circumſtances: the ſanguine and bilious muſt be lowered and emptied; the weak and debilitated muſt be aſſiſted by ſuch medicines as will add force to the vis vitæ; and errors in the treatment of the wound or fracture muſt be corrected; but it is evi-

dent to common ſenſe, that for theſe there is no poſſibility of preſcribing any other than very general rules indeed. The nature and circumſtances of each individual caſe muſt determine the practitioner's conduct.

In general, inflammation will require phlebotomy and an open belly, together with the neutral antiphlogiſtic medicines, pain and irritation will ſtand in need of anodynes, and the Peruvian bark, joined in ſome caſes and at ſome times with thoſe of the cooling kind, at others with the cordial, will be found neceſſary and uſeful. So alſo tenſion and induration will point out the uſe of fomentation and warm relaxing cataplaſms, and the moſt ſoft and lenient treatment and dreſſing. But there are two parts of the treatment of this kind of caſe mentioned by the generality of writers, which I cannot think of as they ſeem to have done. One is, the uſe of ſtimulating antiſeptic applications to the wound; the other is, what is commonly called ſcarification of the limb. (Let it be remarked, that I ſpeak of both theſe, as preſcribed and practiſed while the gangrene is forming,

as

as it were, and the parts are by no means mortified.) While the inflammatory tenſion ſubſiſts, alleviation of pain, and relaxation of the wounded and ſwollen parts, in order to obtain a ſuppuration, and conſequently a ſeparation, ſeem to conſtitute the intention, which ought to be purſued upon the moſt rational principles: warm irritating tinctures of myrrh, aloes and euphorbium; mixtures of tinct. myrrh. with mel Ægyptiac. and ſuch kind of medicines, which are found to be frequently ordered, and indeed are frequently uſed, particularly in compound fractures produced by gunſhot, ſeem to me to be very oppoſite to ſuch intention, and very little likely to produce or to contribute to the one thing which ought to be aimed at, I mean the eſtabliſhment of a kindly ſuppuration. I know what is ſaid, in anſwer to this, viz. that ſuch kind of ſtimulus aſſiſts nature in throwing off the diſeaſed parts: but this is a kind of language, which I believe will be found upon examination to have been firſt uſed without any ſufficient or good ground, and to have been echoed ever ſince upon truſt. It had its foundation in the opinion

that gunſhot wounds were poiſonous, and that the mortification in them was the effect of fire, and it has been continued ever ſince, to the great detriment of many a ſufferer. A gunſhot wound, whether with or without fracture, is a wound accompanied with the higheſt degree of contuſion, and with ſome degree of laceration, and every greatly contuſed and lacerated wound requires the ſame kind of treatment which a gunſhot wound does, as far as regards the ſoft parts. The intention in both ought to be to appeaſe pain, irritation, and inflammation, to relax the indurated, and to unload the ſwollen parts, and by ſuch means to procure a kindly ſuppuration, the conſequence of which muſt be, a ſeparation of the diſeaſed parts from the ſound. Now whether this is likely to be beſt and ſooneſt accompliſhed by ſuch dreſſings and ſuch applications as heat and ſtimulate, and render the parts to which they are applied criſp and rigid, may fairly be left to common ſenſe to determine.

Scarification, in the manner and at the time in which it is generally ordered and performed, has never appeared to me to

have

have ſerved any one good purpoſe. When the parts are really mortified, inciſions made of ſufficient depth will give diſcharge to a quantity of acrid and offenſive ichor; will let out the confined air, which is the effect of putrefaction, and thereby will contribute to unloading the whole limb; and they will alſo make way for the application of proper dreſſings.----But while a gangrene is impending, that is, while the parts are in the higheſt ſtate of inflammation, what the benefit can be which is ſuppoſed or expected to proceed from ſcratching the ſurface of the ſkin with a lancet, I never could imagine; nor, though I have often ſeen it practiſed, do I remember ever to have ſeen any real benefit from it. If the ſkin be ſtill ſound and of quick ſenſation, the ſcratching it in this ſuperficial manner is painful, and adds to the inflamed ſtate of it; if it be not ſound, but quite altered, ſuch ſuperficial inciſion can do no poſſible ſervice; both the ſanies and the impriſoned air are beneath the membrana adipoſa, and merely ſcratching the ſkin in the ſuperficial manner in which it is generally done, will not reach to, or diſcharge either.

From

From what has been ſaid, it will appear, that there are three points of time, or three ſtages of a bad compound fracture, in which amputation of the limb may be neceſſary and right, and theſe three points of time are ſo limited, that a good deal of the hazard or ſafety of the operation depends on the obſervance or non-obſervance of them.

The firſt is, immediately after the accident, before inflammation has taken poſſeſſion of the parts. If this opportunity be neglected or not embraced, the conſequence is either a gangrene or a large ſuppuration with formation and lodgment of matter. If the former of theſe be the caſe, the operation ought never to be thought of, till there is a perfect and abſolute ſeparation of the mortified parts. If the latter, no man can poſſibly propoſe the removal of a limb, until it be found by ſufficient trial, that there is no proſpect of obtaining a cure without, and that by not performing the operation, the patient's ſtrength and life will be exhauſted by the diſcharge. When this becomes the hazard, the ſooner amputation is performed the better. In the firſt inſtance, the operation ought to take place before

inflam-

inflammatory miſchief is incurred; in the ſecond, we are to wait for a kind of criſis of ſuch inflammation; in the third, the proportional ſtrength and ſtate of the patient, compared with the diſcharge and the ſtate of the fracture, muſt form our determination.

Of

Of Dislocations in general.

THE principle inculcated ſo frequently in ſome of the foregoing pages, concerning the extended or relaxed, that is, the reſiſtent or non-reſiſtent ſtate of the muſcles, as depending on the poſition of the limb, may be applied with equal truth and equal advantage to diſlocations, as to fractures. Neither of them can indeed be rightly underſtood or judiciouſly treated without ſuch conſideration. In both, a perfect knowledge of the diſpoſition, force, attachments and uſes of the muſcles, at leaſt thoſe of the limbs, are abſolutely and indiſpenſably neceſſary; and if the young ſtudents would be careful in attending to the plain and obvious parts of anatomy; if they would with their own hands diſſect the muſcles, tendons, blood-veſſels and nerves; if they would examine minutely the ſtructure, diſpoſitions

and

and connexions of all the parts which form the various joints, with their ligaments, and attend to the effects which the actions of the muſcles and tendons connected therewith muſt neceſſarily have on them, they would have much more preciſe and adequate ideas of luxations, than many of them have; they would have ideas of their own, not taken upon truſt from writers, who have for ages done little more than copy each other, and they would act with much more ſatisfaction to themſelves.

By what our forefathers have ſaid on the ſubject of luxations, and by the deſcriptions and figures which they have left us of the means they uſed, of what they call their organa and machinemata, it is plain that force was their object, and that whatever purpoſes were aimed at or executed by theſe inſtruments or machines, were aimed at and executed principally by violence.

Many, or moſt of them indeed, are much more calculated to pull a man's joints aſunder, than to ſet them to rights. I will not go ſo far as to ſay, that they are all equally bad or improper; but I will venture to affirm, that hardly any of them are ſo contrived as to execute the purpoſe for which

they

they ſhould be uſed, in the manner moſt agreeable, or moſt adapted to the nature or mechaniſm of the parts on which they are to operate, or to accompliſh ſuch purpoſe in the moſt eaſy and moſt practicable manner, and conſequently, as I have already ſaid, they act by force principally.

Nor is that all; ſome of them labour under another defect, and that capable of producing great miſchief; which is, that the force or power of the inſtrument is not always determinable, as to degree, by the operator, and conſequently may do too little or too much, according to different circumſtances in the caſe, or more or leſs caution or raſhneſs in the ſurgeon.

I know very well that many of theſe are now laid aſide, and that ſome few have been ſo altered, as to become uſeful; but ſtill the ſame kind of principle, on which theſe inſtruments were originally founded and conſtructed, very generally prevails, and violence is uſed, to the great fatigue, pain, and inconvenience of the patient, in many caſes, in which dexterity, joined to a knowledge of the parts, would execute the ſame purpoſe with facility and eaſe.

In diſlocations, as in fractures, our great attention ought to be paid to the muſcles belonging to the part affected. Theſe are the moving powers, and by theſe the joints as well as other moveable parts are put into action: while the parts to be moved are in right order and diſpoſition, their actions will be regular and juſt, and generally determinable by the will of the agent, (at leaſt in what are called voluntary motions); but when the ſaid parts are diſturbed from that order and diſpoſition, the action or power of the muſcles does not therefore ceaſe, far from it, they ſtill continue to exert themſelves occaſionally, but inſtead of producing regular motions, at the will of the agent, they pull and diſtort the parts they are attached to, and which by being diſplaced cannot perform the functions for which they were deſigned.

From hence, and from hence principally, ariſe the trouble and difficulty which attend the reduction of luxated joints. The mere bones compoſing the articulations, or the mere connecting ligaments, would in general afford very little oppoſition, and the replacing the diſlocation would require very little trouble or force, was it not for the re-

ſiſtance of the muſcles and tendons attached to and connected with them: for by examining the freſh joints of the human body, we ſhall find that they not only are all moved by muſcles and tendons, but alſo, that although what are called the ligaments of the joints do really connect and hold them together, in ſuch manner as could not well be executed without them, yet, in many inſtances they are, when ſtript of all connection, ſo very weak and lax, and ſo dilatable and diſtractile, that they do little more than connect the bones and retain the ſynovia; and that the ſtrength as well as the motion of the joints, depends in great meaſure on the muſcles and tendons connected with and paſſing over them; and this in thoſe articulations which are deſigned for the greateſt quantity, as well as the celerity of motion. Hence it muſt follow, that as the figure, mobility, action, and ſtrength of the principal joints depend ſo much more on the muſcles and tendons in connection with them, than on their mere ligaments; that the former are the parts which require our firſt and greateſt regard, theſe being the parts which will neceſſarily oppoſe us in our attempts

for

for reduction, and whoſe reſiſtance muſt be either eluded or overcome: terms of very different import, and which every practitioner ought to be well appriſed of.

From the ſame examination is to be obtained a kind and degree of very uſeful information, which the ſkeleton cannot afford. I mean an acquaintance with the ligaments themſelves both external and internal, the cartilages both fixed and moveable, and the parts furniſhing what is called the ſynovia.

This to thoſe who are perfectly acquainted with the ſubject, may ſeem too obvious to have needed mention; but no one who has not examined the joints can poſſibly have this kind of neceſſary knowledge, and I am convinced that there are many practitioners who have no idea of articulations, but what the aſſemblage of dry bones has furniſhed them, and which muſt be very inadequate.

I have neither leiſure nor inclination at preſent to enter into this matter minutely, or indeed as it deſerves; beſide which I have, I fear, ſufficiently exerciſed my reader's patience already in the foregoing ſheets,

I will therefore detain him no longer than while I mention a few leading principles relative to luxations in general, drawn from the ſtructure of the parts concerned, and which appear to me to be applicable, with very little if any variation, to every particular ſpecies.

1. Although a joint may have been luxated by means of conſiderable violence, it does by no means follow, that the ſame degree of violence is neceſſary for its reduction.

2. When a joint has been luxated, at leaſt one of the bones of which it is compoſed is detained in that its unnatural ſituation, by the action of ſome of the muſcular parts in connexion with it; which action, by the immobility of the joint, becomes, as it were, tonic, and is not under the direction of the will of the patient.

3. That the mere burſal ligaments of ſome of the joints endued with great mobility are weak, diſtractile, and conſtantly moiſtened; that for theſe reaſons they are capable of ſuffering conſiderable violence without being lacerated; but that they are alſo ſometimes moſt certainly torn.

4. That

4 That did the laceration of the ſaid ligaments happen much more frequently than I believe it does, yet it cannot be a matter of very great conſequence, as it neither totally prevents reduction, when timely and properly attempted, nor a conſequent cure *.

5. That

* In the accident of a diſlocated tibia, from a broken fibula, the ſtrong, inelaſtic, tendinous ligaments, which faſten the end of the former bone to the aſtragalus and os calcis, are frequently torn; and as theſe by proper care almoſt always do well and recover all their ſtrength, there is the greateſt reaſon to expect, that the more weak, diſtractile ones do the ſame. The only miſchief which ſeems moſt likely to follow from a laceration of the latter is, from an effuſion of the ſynovia; of which, I think I have (in a bad habit) ſeen an inſtance in the joint of the ancle. That the laceration of the burſal ligament of the ſhoulder cannot be a frequent or general impediment to reduction appears to me, from my never having in more than twenty years care of an hoſpital, met with a ſingle inſtance of its impracticability, when attempted in time.

For it can hardly be ſuppoſed, that ſuch kind of accident ſhould never have fallen to my lot, or to the people who have acted under me.

But even if this could be ſuppoſed, I can alſo ſay, that I do not remember impoſſibility of reduction to have

5 That ſuppoſing ſuch accident to be frequent, yet as it is impoſſible to know, with any kind of certainty, whether it has happened or not, or in what part of the ligament, it cannot be admitted as a rule for our conduct, nor ought ſuch mere conjecture to produce any deviation from what we ought to do, were there no ſuch ſuppoſition. Could we know with certainty when and where this had happened, very uſeful information might indeed be drawn from it.

6. That all the force uſed in reducing a luxated bone, be it more or leſs, be it by hands, towels, ligatures or machines, ought always to be applied to the other extremity of the ſaid bone, and as much as poſſible to that only.

In every joint capable of diſlocation, the ſame circumſtance which renders it liable to be diſplaced, is alſo a very conſiderable aſſiſtance in its reduction. I mean the dilatability or diſtractile power of the ligaments, their capacity of giving way when ſtretched or pulled at.

This

happened to any of the other gentlemen of the houſe, under the ſame circumſtances.

This is perhaps the ſtrongeſt argument which can be produced, why all the force made uſe of in reducing a diſlocated joint ſhould be applied to that bone only, and not to the next. By the yielding nature of the ligaments of the luxated joint, reduction is to be accompliſhed. The ligaments of the other articulation, which is not luxated are yielding alſo; and all the force which is applied to the bone below or adjoining, muſt neceſſarily be loſt in the articulation which is not luxated, and can be of little or no ſervice in that which is.

Let this principle be applied to the diſlocation of the joint of the ſhoulder, and it will ſhew us why the ambi, in which the whole arm is tied down, and ſubjected to the extending power of the ſaid inſtrument, is defective, and may be pernicious. Why inſtruments built on the ſame general principle, but in which the fore-arm is not faſtened down, but left at liberty and not ſubjected to the ligature, execute their purpoſe with a great deal leſs force. Why the vulgar but frequently very ſucceſsful method of reducing this joint, by placing the operator's heel in the axilla of the ſupine patient, ſometimes fails, the ſurgeon not

having proper aſſiſtance, and contenting himſelf with pulling at the patient's wriſt only. It will alſo ſhew us, why in the caſe of a luxated os femoris at the joint of the hip, the ſtrength of five or ſix people divided between the joint of the knee and that of the ancle, ſhall be inſufficient, and that of four, nay three of the ſame aſſiſtants ſhall in the ſame caſe prove ſufficient, by being all, and properly applied to the knee and femur only, as I have more than once ſeen.

Many other applications of this principle might be made, but theſe are ſufficient to thoſe who underſtand the principle itſelf and ſee its force.

7. That in the reduction of ſuch joints, as are compoſed of a round head, received into a ſocket, ſuch as thoſe of the ſhoulder and hip, the whole body ſhould be kept as ſteady as poſſible, for the ſame reaſon as in the foregoing.

8. That in order to make uſe of an extending force with all poſſible advantage, and to excite thereby the leaſt pain and inconvenience, it is neceſſary that all parts ſerving to the motion of the diſlocated joint, or in any degree connected with it, be put

into

into ſuch a ſtate as to give the ſmalleſt poſſible degree of reſiſtance.

This I take to be the firſt and great principle by which a ſurgeon ought to regulate his conduct in reducing luxations. This will ſhew us why a knowledge of all the muſcular and tendinous parts, acting upon, or in connexion with the articulations, is abſolutely neceſſary for him who would do his buſineſs ſcientifically, with ſatisfaction to himſelf or with eaſe to his patient. It will ſhew us, that the mere poſition of the limb below the luxated joint, is what muſt either relax or make tenſe the parts in connexion with that joint, and conſequently that poſture is more than half of the buſineſs. It will ſhew us, why ſometimes the luxated os humeri ſlips in, as it were, of its own accord, by merely changing the poſition of the arm, when very violent attempts, previous to this, have proved ſucceſſleſs. It will ſhew us why extending the arm in a ſtraight line horizontally, or ſo as to make a right angle with the body, muſt in ſome inſtances, render all moderate attempts fruitleſs. Why the method of attempting reduction by the heel in the axilla is ſo often ſucceſsful, notwithſtanding two

very conſiderable diſadvantages under which it labours, viz. part of the force being loſt in the elbow, and the tenſe ſtate of one head of the biceps cubiti. Why the tying down the fore-arm in the common ambi is wrong, for the ſame reaſons. Why the fore-arm ſhould at all times (let the method of reduction be what it may) be bent, viz. becauſe of the reſiſtance of the long head of the biceps in an extended poſture. Why when the os humeri is luxated forward, or ſo that its head lies under the great pectoral muſcle, the carrying the extended arm backward, ſo as to put that muſcle on the ſtretch, renders the reduction very difficult, and why, on the contrary, the bringing the arm forward, ſo as to relax the ſaid muſcle, removes that difficulty, and renders reduction eaſy. Why the reduction of a luxated elbow ſhould always be attempted by bending the ſaid joint. Why, when the inner ancle is diſlocated in conſequence of a fracture of the fibula, it is extremely difficult at all times, and ſometimes impracticable, either to reduce or to keep reduced the ſaid joint, while the leg is in an extended poſture; and why a bent poſture of the leg enables us with eaſe to accompliſh both

thoſe ends. Why in the caſe of diſlocation of the head of the os femoris, (be it in what manner it may) a ſtraight poſition of the leg and thigh will always increaſe the difficulty of reduction; and why that very diſtorted and bent diſpoſition, in which the patient will always place it for his own eaſe, is and muſt be the poſture moſt favourable for reduction; becauſe it is and muſt be that poſture in which the muſcles, moſt likely to make oppoſition, are moſt relaxed and rendered leaſt capable of reſiſtance *.

9. That in the reduction of ſuch joints as conſiſt of a round head, moving in an acetabulum or ſocket, no attempt ought to be made for replacing the ſaid head, until it

* In the attempts for reduction of a luxated hip, there is one circumſtance, which by being overlooked, or not attended to, has more than once rendered every effort vain.

It is uſual and indeed neceſſary to tie down and confine the patient on a bed or table, in order to keep his body firm and ſteady; one part of the bandage or ſtrapping by which he is confined is fixed in the groin, and paſſing over his belly and under his buttock, is faſtened above or rather beyond his head to ſomething immoveable. If this bandage be placed (as I have ſeen it) in the groin on the ſide of the luxated bone, it will prove ſo far from being aſſiſtant, that it will neceſſarily fruſtrate every attempt.

it has by extenſion been brought forth from the place where it is, and nearly to a level with the ſaid ſocket.

This will ſhew us another fault in the common ambi, and why that kind of ambi, which Mr. Freke called his commander, is a much better inſtrument than any of them, or indeed than all; becauſe it is a lever joined to an extenſor; and that capable of being uſed with the arm, in ſuch poſition as to require the leaſt extenſion, and to admit the moſt; beſide which it is graduated, and therefore perfectly under the dominion of the operator.

It will ſhew us, why the old method by the door or ladder, ſometimes produced a fracture of the neck of the ſcapula; as I have ſeen it do in our own time.

Why if a ſufficient degree of extenſion be not made, the towel over the ſurgeon's ſhoulder, and under the patient's axilla, muſt prove an impediment rather than an aſſiſtance, by thruſting the head of the humerus under the neck of the ſcapula, inſtead of directing it into its ſocket.

Why the bar or rolling-pin under the axilla produce the ſame effect.

Why the common method of bending the arm (that is, the os humeri) downward, before ſufficient extenſion has been made, prevents the very thing aimed at; by puſhing the head of the bone under the ſcapula, which the continuation of the extenſion for a few ſeconds only would have carried into its proper place.

I know it is ſaid, that mere extenſion only draws the head of the bone out from the axilla, in which it was lodged, but does not replace it in the acetabulum ſcapulæ. To which I will venture to anſwer, that when the head of the os humeri is drawn forth from the axilla, and brought to a level with the cup of the ſcapula, it muſt be a very great and very unneceſſary addition of extending force, that will or can keep it from going into it. All that the ſurgeon has to do, is to bring it to ſuch level; the muſcles attached to the bone will do the reſt for him, and that whether he will or not.

Indeed if all the rational means and methods for reducing a luxated ſhoulder be examined, they will be found to act upon this principle, however differently this matter may appear to thoſe who have not attend-

ed

ed to it. Even the common ambi ſucceeds by means of the extenſion, which the carrying the arm down with it produces, and not by its lever. That part of the inſtrument, ſo far from helping, is often a conſiderable hindrance, and even ſometimes fruſtrates the operator's intention, by puſhing the head of the bone againſt the ſcapula, before it is ſufficiently drawn out from the axilla.

If it was neceſſary to add any thing in ſupport of this doctrine, I ſhould ſay, that the ſuppoſition of laceration of the burſal ligament, being a circumſtance frequently attending this luxation, and proving an impediment to reduction, is a ſtrong inducement to us to be always attentive to the making ſuch extenſion, it being much more likely that the head of the bone ſhould return back by the ſame rent in the ligament, when ſuch ligament is moderately ſtretched out, than when it may be ſuppoſed to lie wrinkled or in folds.

10. The laſt principle which I ſhall take the liberty to mention, and which I would inculcate very ſeriouſly is, that whatever kind or degree of force may be found neceſſary for the reduction of a luxated joint,

that

that ſuch force be employed gradually; that the leſſer degree be always firſt tried, and that it be increaſed gradatim.

Whoever reflects on what is intended by extenſion, what the parts are which reſiſt, and how that reſiſtance may be beſt overcome, will want little argument to induce him to accede to this principle; the advantages deducible from attending to it, and the diſadvantages which may and do follow the neglect of it, are ſo obvious.

They who have not made the experiment will not believe to how great a degree a gradually increaſed extenſion may be carried without any injury to the parts extended; whereas great force, exerted haſtily, is productive of very terrible and very laſting miſchief.

I know that the vis percuſſionis, as it is called, has been recommended, as having been ſucceſsful in ſome difficult luxations; but I have ſeen ſuch bad conſequences from it, that I cannot help bearing my teſtimony againſt it. The extenſile and diſtractile quality of the membranes, muſcles and ligaments, enables them to bear the application of very great force to them, without hurt, if ſuch force be applied gradually,

and

and proper time be allowed for the parts to give way in; but great force, ſuddenly applied, is capable of producing the moſt miſchievous conſequences; and that in many other parts of ſurgery, beſide what relates to luxations.

F I N I S.